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The Semantics of Nominal and Clausal Embedding

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How (not) to embed a clause and why

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Lay Summary

This thesis investigates how clauses come to be embedded in other clauses. The clause 'Clive is a rabbit' can stand on its own as a sentence but can also appear as part of a larger sentence embedded by a verb like 'think' ('I think that Clive is a rabbit'). In some ways these embedded clauses appear to behave like nominals, they can be the subject or object of a verb ('That Leicester won the league surprised everyone', 'I discovered that I have a hidden talent'). In other ways, however, they behave very unlike nominals. They appear in places where nominals can't appear, like embedded by nouns or adjectives ('the rumour that Lisa got the job', 'I am happy that you're here'), and they cannot appear in places where nominals can, like embedded by a preposition ('The observation of the patient' but not '*The observation of that the patient was ill'). Furthermore, embedded clauses display semantic behaviour which cuts against many traditional analyses.

In this thesis I bring together insights from Syntax, Semantics, and the Philosophy of Language to argue for a new picture of how clauses come to be embedded, and how they relate to nominals. Clauses are never *arguments* but they can come to appear like arguments by describing the content of an individual. I show how a system can be built from this which explains where embedded clauses appear and how they are interpreted.

This system not only handles some traditionally difficult puzzles in Linguistics and Philosophy, but also helps to provide some insights

about how clauses come to be embedded across other languages, and how these systems might develop historically over time.

Abstract

There is a large class of verbs in English which can embed either a nominal or a clause.

(1) a. Copernicus announced/believes/clarified/discovered/explained [CP that the earth revolves around the sun]. b. Copernicus announced/believes/clarified/discovered/explained [DP the theory].

These clause embedding verbs (CEVs) have been a focus for several strands of recent and not-so-recent work in both Linguistics and Philosophy. In Linguistics these verbs have been of interest to theories of argument selection (Grimshaw (1990), Pesetsky (1996)) and semantic composition (Kratzer (2006)), since CPs are non-prototypical arguments from either a semantic or syntactic perspective. These verbs have also long been important to Philosophers of Language interested in the role that 'propositions', which under the standard account are the denotation of these 'that-clause' (TC) CPs, play in the semantics of 'propositional attitude reports' and related modal and intensional constructions (Prior (1971), King (2002), Moltmann (2003)).

This thesis argues for a novel account of the compositional semantics of CEVs which takes TCs to denote properties of contentful individuals that have two pathways to combine with a CEV, either through restriction or saturation of an internal argument. This account builds heavily on the Predicativist proposal of (Kratzer (2006), Moulton (2009, 2015)) which treats TCs as semantically predicates, in contrast to the standard view in which they denote propositions. Crucially for such an account TCs are not treated as thematic arguments of CEVs, but as modifiers of their objects. I argue that this theory is fundamentally correct, but that empirical

observations about the behaviour of 'presuppositional' CEVs with respect to their available substitutions (Bach (1997)) and entailments (Uegaki (2015)) demonstrate the need to modify the theory further.

The modification that I suggest exploits a recent, independent syntactic argument which demonstrates that some TC complements to CEVs are not bare CPs, but CPs headed by a covert determiner (Kastner 2015). I argue that augmenting the Predicativist semantic proposal with this syntactic claim, along with standard compositional tools allows us to explain a variety of data which was puzzling under pre-existing theories. The presuppositional DPs that result from combining a covert determiner with a predicative clause (denoting some definite individual with the proposition inside the embedded clause as its content) compose with the CEV by saturating its internal argument position, unlike the bare CPs which combine by restricting it. The new proposal has the advantage of capturing the classic puzzles for CEVs, including the entailment failures which were difficult for the unaugmented Predicativist account, whilst also being the result of a natural extension of standard compositional semantics for definite DPs with embedded nominas.

This approach also provides novel insights into generalisations from the linguistic literature on argument selection and case, as it makes concrete predictions about how clausal 'arguments' interact with the case and theta systems. These predictions can be tested against a number of classically difficult phenomenon like experiencer predicates (Reinhart (2003)) and the verb 'explain' (Pietroski (2000)). I demonstrate how these predictions are borne out, supporting the proposal and advancing our understanding of these topics.

The thesis is structured as follows: Chapter 1 presents a series of puzzles derived from TC and DP embedding under CEVs, namely, Quantificational inferences, Fine-grained semantic selectional restrictions, the variability of attitudinal objects, and content noun

entailment patterns. I argue that no existing account is capable of explaining all of these puzzles, and that the dominant Propositionalist theory must be mistaken in several of its key assumptions. In Chapter 2 I introduce the alternative Predicativist account of the semantics of TCs (Kratzer (2006), Moulton (2009, 2015)), discuss the motivations for such an account, and I provide a novel argument for the position based on copula constructions with post-copula TCs. I then show how this theory accounts for most of the puzzles introduced in chapter 1, but cannot deal with the entailment failures of a certain subclass of CEVs. Chapter 3 then suggests that this class of entailment failing verbs is coextensive with the class of verbs identified in Kastner (2015) as selecting for TCs which are syntactically DPs and interpreted as presuppositional. I provide evidence for this analysis and discuss some cross-linguistic analogues with overt determiners with CP complements. I then propose a compositional semantics for these presuppositional TCs adapted from the Predicativist account argued for in chapter 2. I then show how the resultant account resolves all of the empirical puzzles set up in chapter 1, without introducing any new syntactic or semantic machinery that has not already been independently proposed. Chapter 4 explores the predictions and consequences of this theory for other domains of the selection literature, in particular relating to ECM, factivity, question-embedding, communicatives, and experiencer alternations. I argue that the proposal meshes well with existing proposals about how to understand case-assignment and argumenthood (Stowell (1982)). In the conclusion I discuss some consequences for the Philosophical literature on propositional attitudes, and present cross-linguistic and historical evidence for the plausibility of my account which invite future empirical work on the topic.

Declaration

I declare that this thesis has been composed solely by myself and that it has not been submitted, in whole or in part, in any previous application for a degree. Except where stated otherwise by reference or acknowledgment, the work presented is entirely my own.

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Contents

Chapter 1

Introduction

On sentences with embedded 'that'-clauses, Donald Davidson said:

> "One trouble with such sentences is that we do not know their logical form. And to admit this is to admit that, whatever else we may know about them, we do not know the first thing." (Davidson, 1969)[p130].

Concerted effort from both Linguistics and Philosophy of Language means we do indeed know quite a lot about such sentences, a lot more than was known in 1969. Despite this however, we still don't know the first thing. At its heart, the research question of this thesis is the same one as raised by Davidson, namely what is the logical form of sentences with embedded finite declarative clauses.

The central claims of this thesis are as follows, accompanied by the chapter or chapters in which the arguments for these claims are made, to serve as a roadmap to the reader:

(1) The arguments of clause embedding verbs (CEVs) are exclusively individuals of type e, and not as has been standardly assumed, propositions [Chapters 2 and 5]

(2) The semantic type of CPs is that of a predicate, that is (the characteristic function of) a set of individuals $\langle e, t\rangle$ [Chapter 3]

(3) Apparent CPs which appear in certain syntactic configurations, as sentential subjects or the objects of presuppositional CEVs are in fact DPs headed by a covert definite determiner Δ. This distinction is syntactically testable and maps onto a corresponding semantic distinction in how these DCPs compose with their embedding verb. [Chapter 4]

(4) The realisation and interpretation of CP arguments can be predicted and explained by incorporating these conclusions into the wider system of nominal argument realisation based on Case and Theta theoretic considerations.

[Chapters 4 and 5]

Further, I look into how these ideas might be fruitfully employed in typological work and how these may shed light on the philosophical issues that we began with.

The key constructions we will investigate are CPs in the object position of CEVs, and so-called Noun Complement Clauses (NCCs).

(5) Tom believes [$_{\text{CP}}$ that Clive is a rabbit].

(6) The rumour [$_{\text{CP}}$ that Clive is a rabbit] ...

Two other illuminating constructions will be CPs in postcopular position with precopular DPs (DPbeCP), and sentential subjects.

(7) The rumour is [$_{\text{CP}}$ that Clive is a rabbit].

(8) [$_{\text{CP}}$ that Clive is a rabbit] surprised no-one.

We should note that these are not the only places that finite CPs can appear in English. Two other obvious cases are post-adverbially, and in result or purpose clauses alongside adverbs.

(9) I am happy [$_{\text{CP}}$ that Clive is a rabbit].

(10) He hopped to the bowl such that he could drink the water.

(11) He was full enough that he didn't need to eat anymore.

None of these latter constructions will be analysed in detail in this thesis, but I am hopeful that the system given here will be extendable to these contexts.

1.1 Aims and Structure

This thesis is an attempt to make meaningful progress on the question of the semantics of embedded finite declarative clauses and by extension the nouns and verbs which embed them. To answer this I appeal to several recent advances in the semantics and syntax of these constructions, both in English and other languages. A central aim of this thesis is to bring several of these strands together in order to answer both new and old problems in the semantics of clause embedding predicates.

Firstly the work in Philosophy of Language on the relationship between DP and CP complementation to clause embedding predicates, in the form of answers to the classic '*Substitution Problem*'. This problem for the traditional *Propositionalist* account was first raised in the 60s and 70s (Kiteley, 1964; Vendler, 1967; Rundle, 1968; Prior, 1971), but has come under renewed interest in recent years, firstly at the

turn of the millennium (K. Bach, 1997; King, 2002; Moffett, 2002, 2003; Moltmann, 2003, 2004a), and subsequently again in the past 5 years (Felappi, 2016; Elliott, 2017; Forbes, 2018; van Elswyk, 2019; Nebel, 2019; Moltmann, 2020; D'Ambrosio, 2021; Güngör, 2022). In chapter 2 I show how insights from this problem can shed light on the semantic selection of clause embedding verbs, in particular demonstrating that the semantic object of a CEV is an individual, rather than a proposition.

Secondly there has been a productive new proposal for the semantics of embedded finite declarative clauses, that they denote predicates, both when embedded under nouns and when under verbs. The original insight for this proposal is by Kratzer (2006), but it has subsequently been developed in particular by Moulton (2009a, 2015) and subsequently taken up to address a wide range of phenomena in a wide range of languages (Uegaki, 2015a; Elliott, 2016, 2017; Bogal-Allbritten, 2016; Bogal-Allbritten & Moulton, 2018; Hanink & Bochnak, 2017; Bondarenko, 2020; Djarv, 2021). In chapter 3 I present this view and provide an original argument for it against the competing *appositional* analysis of noun complement clauses. I then show how, following (Kratzer, 2006; Moulton, 2009a), this semantics can be extended to CPs embedded by verbs, using of-the-shelf compositional mechanisms of restriction and existential closure, which are already taken for granted in the nominal domain. The resulting picture captures many of the key insights of the recent Philosophical literature, though it makes an incorrect prediction with respect to entailments with a certain class of verbs, and does not have an account for the semantics of CPs in copular, true appositional, or sentential subject constructions.

The key to resolving these difficulties lies in new and old advances in the syntax of CP embedding. Kastner (2015), building on a long tradition starting with Kiparsky and Kiparsky (1971), shows that some apparent English CPs are in fact DPs, headed by a covert definite determiner Δ. The contexts where this occurs, objects of presuppositional verbs, sentential subjects, and postcopulars, are precisely the environments which were problematic for the predicativist analysis. I therefore provide a compositional semantics for these D-CP structures which allows them to be captured in the same systems as definite DPs, using the familiar notions of Stalnakarian common ground (Stalnaker, 1972, 1975, 2002) and maximise presupposition (MP!)(Heim, 1990). We then look at how the two compositional strategies RESTRICT and SATURATE relate to eachother.

In Chapter 5 we apply the theory to some issues in the Linking problem, the mapping of thematic roles to syntactic positions, in terms of two systems, the Case system and the Theta system. I show how the calculus set up in the previous chapters can be used to address several classic problems in the study of argument realisation, namely experiencer predicates, and communicative ditransitives.

In the conclusion we zoom out to see how the picture for English predicative CP

relates to strategies in other languages, both synchronically and diachronically.

The thesis is structured in two parts, after chapter 1 which gives some theoretical and philosophical background. Chapters 2, 3 and 4 argue for a picture of the semantics of CEVs, and chapters 5, and 6 explore the consequences of this theory.

To aid in navigation, here is a summary of the leading idea, key arguments, and take away point from each chapter.

(12) a. **Chapter 2**

(i) *Leading Idea*

CEVs select for individuals not propositions

(ii) *Key Arguments*

CEVs embed both DPs and CPs

CEVs are not polysemous

The observations cannot be accounted for by type-shifting

(iii) *Take away*

Observations from DP and CP embedding to be explained: Quantificational inferences, Selectional Restrictions, Variability of Attitudinal Objects, and Entailment Patterns

b. **Chapter 3**

(i) *Leading Idea*

CPs are Predicates

(ii) *Key Arguments*

NCCs are not equative or appositional

NCCs describe the content of an individual, not necessarily its truth conditions

Predicate CPs can be extended to CEVs using only independently motivated compositional mechanisms from the nominal system

(iii) *Take away*

Whilst the Predicative account is broadly succesful with respect to the phenomena considered, it needs to be extended to account for all of the data: Sentential Subjects, Postcopular and appositional CPs, and Presuppositional CEVS

c. **Chapter 4**

(i) *Leading Idea*

DCPs denote definite individuals

(ii) *Key Arguments*

Sentential subjects and objects of Presuppositional CEVs are DPs

The English covert clausal determiner is identical to the nominal definite determiner

The distribution of bare CPs and DCPs as the objects to CEVs can be explained semantic-pragmatically with MP!

(iii) *Take away*

There are two syntactic structures, DCPs and bare CPs, which compose with verbs through different compositional mechanisms SATURATE and RESTRICT

d. **Chapter 5**

(i) *Leading Idea*

The distribution and interpretation of CPs is explained by interactions between SATURATE, RESTRICT and the case and theta-systems.

(ii) *Key Arguments*

DPs, including DCPs, require case

Bare CPs cannot be assigned case

Traditional puzzles involving say-verbs, experiencer predicates, and 'explain', are straightforwardly handled on this account

(iii) *Take away*

The odd syntactic and semantic behaviour of CPs is a result of their interaction with the nominal argument system

e. **Chapter 6**

(i) *Leading Idea*

Predicate CPs are one strategy among many to integrate clauses into the nominal argument system

(ii) *Key Arguments*

Other strategies to get 'embedded' readings of clauses exist: Parataxis, Prolepsis, Nominalisation, Slifting

These strategies have in common that clauses do not behave as arguments

These strategies also have to interact with the nominal argument system, and are generally less effective and unambiguous, recursive embedding of clauses

(iii) *Take away*

Predicate CPs are a natural and effective strategy for embedding a clause without taking it as an argument, but it is only one strategy among many possible ones

1.2 Theoretical Background and Assumptions

1.2.1 Semantic Assumptions

Let's start by establishing some theoretical background. The semantic framework in which this thesis is conducted is the now standard type-driven compositional semantics of Montague (1973), in particular as it is implemented in Heim and Kratzer (1998). The core assumption here is that the semantics of natural language operates on a small set of basic *types*, functions from types to types, and two compositional rules. Heim and Kratzer demonstrate how a huge range of phenomena in the semantics of natural language can be captured with this this small inventory. We won't reiterate the entire system here, but I will highlight some features which will be relevant for our analysis. Firstly our set of basic types is *Individuals* - e, truth values - t, and worlds - s. Other types are available, for example intervals - i, degrees - d, and numbers -n, which are taken to be disjoint from the set of individuals(Champollion, 2017). These won't be implemented in our system as they are not relevant to the phenomena under discussion, but something important to observe is that we make no type-theoretic distinction between individuals and eventualities. Eventualities are treated as a subdomain of the domain of individuals, which we will sometimes denote as v. This follows much work on the analogies between the structure of events and the structure of individuals (Link & others, 1983; E. Bach, 1986; Lasersohn, 2013). This assumption is not absolutely critical for our theory, but we have good reasons to believe it and if it is true then it makes the resulting picture much neater.

Another element of the Heim and Kratzer system is that it uses a very minimal set of compositional rules, namely Functional Application (FA) and Predicate Modification (PM). The system we implement here uses the compositional mechanisms in Chung (2001), which are SATURATE, an analogue of FA, and RESTRICT, a generalised version of PM. We will discuss the precise implementation of these when they arise in chapters 4 and 3 respectively. I take it to be a desirable theoretical goal if we can capture the semantics of CP embedding with as small as possible a set of semantic operations, and ideally where those operations are justified in other, independent aspects of the system. This challenge is met here, by showing how the operations of RESTRICT and SATURATE, originally proposed to deal with the composition of nominals can be extended unproblematically to deal with predicative CPs.

The semantics we pursue is fundamentally *Davidsonian*. The verb is taken to be the core of the sentence, introducing an event argument which DPs relate to either by being selected directly as arguments of the verb, or by being introduced by a thematic head. I will assume, following Marantz (1984); Kratzer (1996), that external arguments are introduced above the VP by a little v layer, but that internal

arguments are selected directly by the verb. This contrasts with a 'neo-davidsonian' approach in which all arguments are severed from the verb (Parsons, 1990). For our purposes, nothing much rests on this choice of formalism. I have no concrete objections to viewing the entries I provide for verbs with an argument place for their internal argument as contractions of a more structurally complex configuration in which the internal argument is selected for and related to the event by a separate THEME head, as in (Elliott, 2017).

1.2.2 Syntactic Assumptions

The syntactic framework adopted here is broadly generative. Though I avoid where possible being committed to any particular syntactic research program, there are a few key syntactic assumptions that are worth highlighting. I assume the *DP Hypothesis* (Abney, 1987), that nominal groups are headed by a determiner and are therefore DPs, in contrast to the traditional analysis of these structures as NPs headed by a noun. This proposal has come to dominate most modern syntactic theories, though it is by no means universally accepted (Santorini, 2007). As mentioned above I assume that external arguments are introduced both in the syntax and semantics by an additional functional projection above the VP, the little vP.

Though I will not rely on this as an assumption, I would take it to be a theoretically desirable result if we could maintain a mapping from syntactic categories to either a single semantic type or a small range of semantic types derived from a restricted range of type-shifting operations (Montague, 1973; Partee, 1986). In many frameworks such a mapping is assumed, Combinatory Categorial Grammar being a prime example (Steedman, 1996, 2001). If true, a transparent mapping between syntactic categories and semantic types would give a clearer picture of what the interface between the two systems should look like. Though I do not use this principle as an argument to decide between theories when empirical evidence is at hand to do so, I consider it to be a virtue of the theory advanced in this thesis that it gives a way to preserve the principle, rather than resorting to any unconstrained semantic type shifting.

In chapter 6, I adopt a Reinhartian interpretation of the broad role theta and case systems, but especially in chapter 5 I am as neutral as possible with respect to any framework. In particular I don't want to be committed to a *Lexicalist* framework in which semantic or morphosyntactic operations are carried out primarily in a dynamic lexicon (Reinhart, 2003, 2016; Marelj, 2016; Horvath & Siloni, 2016), in contrast to a more *distributed* model in which lexical roots carry very little information and morphosyntactic category and semantics are built up through combination

with functional heads in the syntactic derivation (Halle, Marantz, Hale, & Keyser, 1993; Halle, Marantz, & others, 1994; Borer & others, 2005). To be clear, the importance of Case and Theta grids in determining the realisation of arguments is uncontroversial across an extremely large number of programs (Chomsky, 1995; Reinhart, 2003; Grimshaw, 1990; D. M. Pesetsky, 1996; B. Levin, Hovav, & others, 2005; Baker, 1997, 2003, 2015; Neeleman & Weerman, 2012). Where possible I try to rely only on widely agreed principles in this domain, only committing to particular systems when it is required to deal with the empirical phenomena. To foreshadow, this will involve adopting a Pesetskian view on C-selection as being fundamentally selection for Case.

Terminological Clarification

It's worth taking some time to clarify some terminological conventions that I will adopt in the thesis to make the exposition more clear.

For terminological simplicity, I use Complementiser Phrase', 'CP', to refer to finite declarative clauses with a, possibly phonologically null, complementiser. In English these are 'that'-clauses. Interrogative clauses, non-finite clauses, and relative clauses are typically also taken to be CPs, and their relationship to the phenomena considered here will be introduced in later chapters, but it should be assumed unless mentioned otherwise that when I use 'CP' I am referring to finite declarative clauses headed by a complementiser.

I often use the term 'embed' or 'embedded' where 'complement' or 'object' may seem more natural. This choice is made precisely so as to remain neutral with respect to the syntactic or semantic status of a CP in relation to a noun or verb so as to not beg the question.

I use the term Clause Embedding Verb 'CEV' rather than the more common Clause Embedding Predicate 'CEP' where I want to be clearly contrast this with other categories of predicate which are capable of embedding a CP, e.g. adjectives or nouns.

(13) a. I am happy that Clive is a rabbit.
b. The fact that Clive is a rabbit.

Given that the distinctions between events and states (Kimmian or Davidsonian) is not directly relevant, when there is no potential for confusion I will use the term 'event' as synonymous with eventualities in general.

Though I assume that some form of intensional semantics will be necessary to model even DPs in non-intensional contexts, in general I omit indexing to possible worlds for ease of exposition unless it is directly relevant.

1.3 Propositions and Propositionalism

Before beginning with the body of the thesis, we should address the large body of Philosophical literature bearing on the question at hand. First lets deal with the term '*Proposition*'.

Propositions are taken to have many roles(King, Speaks, & Soames, 2014).

(14) a. The meanings of declarative sentences.
b. The semantic value of 'that'-clauses.
c. The objects of certain attitudes.
d. The primary bearers of truth.
e. The bearers of modal properties.

Why think that any one class of object should exist which satisfies all of these roles? The evidence typically adduced in favour of this is primarily, though not necessarily exclusively, linguistic (Moltmann, 2003). For each of the roles above there are sentences which appear to justify them (King, 2002; King et al., 2014; McGrath, 2014).

(15) a. 'The Earth is round.'
b. 'The proposition that the Earth is round. . . '
c. 'I believe that the Earth is round.'
d. 'That the Earth is round is true.'
e. 'It is possible that the Earth is round.'

Sharp-eyed readers will likely already have noted that this justificatory linguistic evidence comes in the form of precisely those constructions which we aim to analyse in this thesis, with the exception of the full declarative sentence in (15-a). We have respectively, Noun Complement Clauses, a Clause Embedding Verb, a sentential subject, and two copular clauses. We shall see how in each case the traditional Philosophical analysis of these constructions is not in line with the empirical phenomenon. Note that this is not an argument against the existence of propositions *per se*, we certainly need something in our semantic theory to be the meaning of a TP, and 'proposition' is just as good a word as any for this. But we do call into question whether the sentences in (15) really are justification for one and only one object doing so many jobs in our semantic or metaphysical theories.

Something which may seem so trivial as to not be worth noting is that 'that'-clauses differ from main clauses in at least that they contain the word 'that' at the front of them. It is typically assumed that embedded CPs should have the same semantic value as unembedded TPs, but we can't just take this assumption as given. The complementiser may turn out not be semantically vacuous.

I will use the term *proposition* to refer to the semantic value of a TP, that is a full declarative clause, whatever that semantic value may turn out to be. Since TPs are embedded inside of CPs, propositions will have to play some role in the compositional semantics of CPs, but we are not entitled to assume that the C-head will contribute nothing to meaning of the phrase.

(16) [.CP [.C that] [.TP Clive is a rabbit]]

By making this terminological choice we make the first role for propositions 'the meanings of declarative sentences' true by definition. The other roles however, all depend on a particular, face-value, Fregean conception of the semantics of CPs and the predicates which embed them. It is then an open question as to whether only one type of object satisfies all of these roles. The answer to this question, this thesis will show, is in fact 'no'. As David Lewis identified, "the conception we associate with the word 'proposition' may be something of a jumble of conflicting desiderata" (Lewis, 2005)[p54].

For concreteness and as is standard I will model propositions as sets of worlds, type $\langle s, t\rangle$ (Montague, 1973; Heim & Kratzer, 1998). It has been known, even since its inception, that this 'intensional' account of propositions is insufficient (Carnap, 1947). Possible worlds are too coarse-grained to individuate sentence meanings in either embedded or unembedded contexts (Cresswell, 1985; Pollard, 2015). Various alternative candidates have emerged in subsequent years, most prominently, situation-based semantics (Barwise & Perry, 1981; Kratzer, 2013), structured propositions (Cresswell, 1985; Pickel, 2017), and truth-maker semantics (Fine, 2017; Moltmann, 2020). Though we will pursue the predicativist view of CPs, in line with (Heim & Kratzer, 1998) I continue to use the traditional $\langle s, t\rangle$ model for the meanings of TPs, with the intention of remaining neutral enough that whatever the best model of propositions end up being, we can substitute that in.

So-called *Propositional Attitude Reports* have been central topics of interest to Philosophy of Language since at least Frege (Frege, 1948; Künne, 2015). The view espoused by Frege, which I shall call *Propositionalism*, takes the semantic value of CPs to be a proposition ('Thought') which can be the complement of a verb which expresses a relation between a subject and that proposition, much like how any other transitive verb relates a subject to an object.

> One designates a thought in indirect speech. The sentence "Copernicus was of the opinion that the planetary orbits are circles" is an example. In the whole sentence 'Copernicus' designates a man, just as the subordinate clause 'that the planetary orbits are circles' designates a thought; and the sentence says that a relation obtains between this man and this

> thought, namely that the man took the thought to be true.

Frege Letter to Bertrand Russell November 1904 Translation (Künne, 2015)

To show that variations of this view are still predominant in Philosophy of Language, consider the following comments:

> Is it not obvious that the predicates of propositional attitude and epistemic state express relations, whose objects may be indicated by complentized clauses ("that"-clauses, infinitives, and gerunds), and that predicates of modality or probability are true or false of the same sorts of things, whatever they turn out to be exactly?

(Higginbotham, 2009)

> 'The most elementary point about the semantics of sentences about propositional attitudes is that such sentences have the form of a relational propositional-attitude predicate with singular argument places for at least a subject (e.g. a person) and something believed (thought, desired, intended, said). This latter ... is, with some qualification, the semantical value of the grammatical object of the propositional-attitude verb'

(Burge, 1980)

> There is very strong logical and linguistic evidence for the following tenets. "Say", "mean", "believe", "is possible", and so forth often function as predicates, and "that"-clauses function as singular terms in companion sentences (e.g., "I believe that A" ...)

(Bealer, 2002)

> 'There is no plausible alternative to taking belief sentences as relational, and therefore no alternative to taking the [that-clause in a belief sentence] as a singular term which, by referring to an appropriate entity, specifies the relevant belief'

(Davidson, 2001)[1]

> When we attribute a belief by saying something of the form *x believes that P*, we say that a certain relation, expressed by *believes*, holds between *x* and an object of belief - something denoted by the sentential complement, *that P*.

[1] As Schiffer (2003) notes, this is a surprising claim for Davidson to make, given his position (Davidson, 1969) that this is *not* the correct logical form of this type of report.

(Stalnaker, 1984)

> According to current philosophical orthodoxy, a belief report ... is true just in case the subject of the attribution stands in the belief relation to a proposition that is referred to by the that-clause. ... No doubt, a careful perusal of the literature will reveal a few outliers; but far more often than not, the face-value view is simply assumed without argument.

(Buchanan, 2012)

> There is a something of a consensus in the philosophy of language that English 'that'-clauses are singular terms. At the same time, there is substantial disagreement over the entities they denote.

(Moffett, 2003)

> [Propositionalism is] a theory which appears at face value to be correct; it's the default theory that must be defeated if it's not to be accepted".

(Schiffer, 2003)

Distilling from these different authors, there are two main claims being made by Propositionalist accounts.

(17) [**Relational Analysis** of CEVs] Clause embedding verbs such as 'know', 'think', 'hope' denote a *relation* between a subject and a proposition.

(18) [**Propositional Reference** of **CPs**] 'That P' denotes the proposition that P.

It is clear how these claims are central to the motivation for Propositions to be playing the diverse roles they are typically taken to. If CPs do not refer to propositions then the linguistic evidence presented in support of one object playing these roles falls apart, as it relies on the presence of 'that-clauses' embedded in a larger sentence.

The goal of the next two chapters of this thesis is to show that both of the central claims of Propositionalism are incorrect. It will be shown that treating CEVs as relations to propositions is too coarse-grained to capture the fine-grained semantic selectional restrictions that these verbs impose on their nominal arguments. I will also address why none of the existing solutions which try to reconcile nominal and clausal arguments to CEVs capture the right entailment patterns we observe with these constructions, though many provide useful insights into the true semantics of CEVs.

Of course this does not rule out the possibility that there is some other, non-linguistic evidence in support of using propositions to understand these concepts, but it does serve as a warning against relying too naively on natural language to be transparent for metaphysics. And we should also note that negatively ruling out the traditional analysis is only the first step, we still need to find an appropriate analysis which does capture all of the empirical data.

Chapter 2

Puzzles of Clausal and Nominal Embedding

2.1 Introduction

There is a large class of verbs in English which can embed either a nominal or a clause.

(1) a. Copernicus *announced/believes/clarified/discovered/explained* [$_{\text{CP}}$ that the earth revolves around the sun].
b. Copernicus *announced/believes/clarified/discovered/explained* [$_{\text{DP}}$ his theory].

Their behaviour when taking Determiner phrases (DPs) or finite declarative complementiser phrases (CPs) presents a challenge in giving a unified semantics for such verbs. It is typical to assume that the CP embedding use is 'more basic' in some sense. That is, a CEV like 'believe' fundamentally takes CP complements, presumably denoting propositions, and only derivatively takes DP complements. I aim to show that this conception is fundamentally at odds with the semantic behaviour of CEVs in terms of their selectional restrictions and their inferences with various quantificational and semantically 'bleached' DPs. CEVs, like other verbs only take individual denoting, DPs as selected arguments. An empirically adequate account of the semantics of CEVs must therefore find a way to incorporate CP 'arguments' in relation to the 'true' individual arguments. In chapter 3 I propose that treating CPs as denoting predicates of contentful individuals provides just such a solution.

This chapter presents a series of empirical observations pertaining to the semantics of DP and CP embedding which a theory of these Clause Embedding Verbs (CEVs) should account for. These are: Inferences with quantifiers, fine-grained selectional restrictions, variability of attitudinal objects, and entailment patterns

with noun complement clauses. I also discuss an old and well-known problem for traditional, Propositionalist, analysis of CEVs, the substitution puzzle. I argue that no existing account is able to accommodate all of these observations and that solutions which appeal to polysemy, syntactic selection, or type-coercion are equally untenable.

I conclude by elaborating on the central tension generated by nominal and clausal embedding to CEVs and outline the conditions that a successful account would have to meet in order to account for the empirical data. This chapter is therefore primarily negative, laying out the empirical puzzles for a semantic theory of CEVs and challenging existing accounts. The central positive claims are:

(2) CEVs take type e individuals as arguments, not type $\langle s, t\rangle$propositions.

The key takeaway is that propositions are too coarse grained to capture the patterns of nominal embedding with CEVs.

2.2 Preliminary Observations concerning CP and DP embedding

The majority of this chapter will be devoted to a discussion of substitution problems and their related entailment patterns, but I will begin by putting on the table some more basic observations about the interaction between CP and DP 'complements' to CEVs, which will help as desiderata for theories of the semantics of CEVs.

The first observation, quantificational inferences, is handled well on standard, face-value, approaches to the semantics of CEVs, but the subsequent puzzles, fine-grained semantic selectional restrictions, and variability of attitudinal objects, are not neatly captured by traditional accounts and so will help to motivate and evaluate the more sophisticated positions later in this chapter.

2.2.1 Inferences with Quantifiers

CEVs very generally license valid inferences like those from (3-a) to (3-b).

(3) a. George knows/believes/thinks/hopes/discovered that his hand is real.
b. George knows/believes/thinks/hopes/discovered something.

These inferences are very easily captured by views, which we will later argue against, which treat the CP 'complement' to the CEV as denoting an individual object, which the quantifier *something* is capable of ranging over. If, for example, *believes* denotes a relation between an Agent George (g) and a proposition (p), and p is in the domain

of the quantifier *something*, then the entailment can then be handled easily as an instance of existential generalisation.

(4) a. g believes p
b. $\exists x$B(g,x)

Similar arguments would straightforwardly apply to appropriate inferences with other *-thing* quantifiers such as 'anything', 'nothing', 'five things'[1].

K. Bach (1997) discusses another class of other entailments with quantifiers and CPs where (5-a) and (5-b) jointly entail (5-c), as do (6-a) and (6-b) for (6-c).

(5) a. Art believes everything that Bart says
b. Bart says that Nixon was a crook.
c. Art believes that Nixon was a crook.

(6) a. Art believes that Nixon was a crook.
b. Bart believes that Nixon was a crook.
c. There is something that Art and Bart both believe.

(5) and (6) demonstrate that these quantificational inferences are possible across different CEVs and different agents. These inferences too, are easily handled under a view where CPs denote some individual object of the verb, which is ranged over by the quantifiers *something* and *everything*. This is therefore prima facie evidence for this 'face-value' theory of CP embedding, which treats CEVs as relations between a subject and an object denoted by the CP.

2.2.2 Selectional Restrictions

Verbs are capable of imposing syntactic and semantic selectional restrictions on their objects (Chomsky, 2014). Syntactic selection for a category (c-selection) such as DP, CP, or PP will be discussed in greater detail in chapter 4. Semantic selection (s-selection) has generally been discussed in the linguistic literature with respect to fairly coarse grained semantic categories like *question* and *proposition* in the analysis of interrogative and declarative clause embedding (Grimshaw, 1979; D. M. Pesetsky, 1996; Lahiri, 2002). These distinctions can plausibly be understood as type mismatches, with propositions as sets of worlds $\langle s, t\rangle$and questions as sets of propositions (that is, sets of sets of worlds $\langle\langle s, t\rangle, t\rangle$, which are the sets of possible answers to the question) in the style of (Hamblin, 1973), which allows the restrictions to be modeled by as a type-theoretic constraint on the internal argument of the verb.

[1]Skating over philosophical complications related to what it means to believe, think or know 'five things' or 'more things' (Treanor, 2013)

(7) a. Kadri believes that freedom is important.
b. *Kadri believes what is important.
c. $[\![believe]\!] = \lambda p_{\langle s,t \rangle}.\lambda x_e.x$ believes p

(8) a. *Kadri wonders that freedom is important.
b. Kadri wonders what is important.
c. $[\![wonder]\!] = \lambda Q_{\langle \langle s,t \rangle,t \rangle}.\lambda x_e.x$ wonders Q

This approach is able to neatly capture the (un)grammaticality of the examples in (7) and (8) as the interrogative and declarative clauses fail to satisfy the semantic type requirements of the CEV. This approach has some work to do to explain the behaviour of responsive predicates, such as 'know', which can embed both declarative and interrogative clauses and a variety of proposals exist (Lahiri, 2002; Uegaki, 2015b; Theiler, Roelofsen, & Aloni, 2016; Spector & Egré, 2015). We will return to these issues in chapter 4.

However close inspection of CEVs reveals that they are also capable of imposing more fine-grained restrictions on the semantics of their complements, even when we would expect their semantic type to be that of an individual e, and even within the category DP. Fine-grained semantic restrictions can result in a sentence being unacceptable when a verb is combined with a DP which does not satisfy the requirements imposed on it. This unacceptability is sometimes described as a *category mistake* (Harman, 2003), or as a *sortal error* (Elliott, 2017).

Fine-grained Semantic Selection on non -CEVs

To illustrate the possibility of finer-grained semantic selection for nouns with specific semantic properties in other contexts consider the case verbs like *gather* or *collect* selection for DPs which are semantically plural or mass-construed (Bruening, 2009; Larson, 2019).

(9) a. John gathered the students/the mist.
b. #John gathered the student/the book[2].

Note that this semantic selection holds even when the DP is formally plural but semantically singular, as with pluralia tantum (*the scissors/trousers*) or when the DP is formally singular but semantically plural (*the committee/coven.* Examples adapted from (Larson, 2019)

(10) a. #John gathered the scissors/the trousers. [3]
b. John gathered the committee/coven.

[2]Unless *the student/book* has a mass reading.
[3]When there is only one pair of scissors/trousers.

This selection must therefore be semantic in nature and be capable of probing for finer-grained semantic properties like plurality. In the following sections I will show that analogous semantic restrictions hold for certain CEVs, which are capable of probing for fine-grained semantic properties like *being linguistic material*.

Propositions versus Facts

The most widely discussed example of this is the contrast between the DPs '*the proposition*' and '*the fact*' as complements to non-factive versus (semi)-factive verbs (Kiparsky & Kiparsky, 1971; Karttunen, 1971; Grimshaw, 1979; Ginzburg & Sag, 2000). Non-factive *believe* is acceptable with the DP *the proposition*, but unacceptable with *the fact* and vice versa for semi-factive *know* or factive *regret*[4].

(11) a. Laura believes that Adele left the room.
b. Laura believes the proposition that Adele left the room.
c. #Laura believes the fact that Adele left the room.

(12) a. Laura knows that Adele left the room.
b. # Laura knows the proposition that Adele left the room.
c. Laura knows the fact that Adele left the room.[5]

(13) a. Laura regrets that Adele left the room.
b. #Laura regrets the proposition that Adele left the room.
c. Laura regrets the fact that Adele left the room.

This data suggests that verbs like *believe* semantically select for the kinds of things denoted by the DP *the proposition*, but not those denoted by *the fact* and vice versa for *know*.

Moffett (2003, 2005) refers to this as the problem of *Doxastic Shift* and uses it to argue for a position wherein CPs can alternately denote propositions, when embedded under *believe*, or facts, when embedded under *know/regret*. A similar approach is used in Ginzburg and Sag (2000), where CPs are argued to be interpretable as either propositions or facts depending on the the factivity of the embedding verb.

A distinct, but related, tradition inspired by (Kiparsky & Kiparsky, 1971) treats factive embedded CPs as syntactically more complex than their non-factive counterparts. Factive CPs, it is argued, are in fact DPs headed by a covert element THE FACT. This proposal aims to allow CPs to be univocal, always denoting a proposition, and explains their ability to appear under factive, that is non-proposition

[4]Though a significant amount of philosophical literature is primarily concerned with the contrast between *believe* and *know*, *regret* is included here for comparison as a true factive, since the 'unacceptability' of (12-b) might be analysed as a shift in meaning to an acquaintance relation, rather than as true semantic incompatibility

[5]Examples adapted from (Moffett, 2003)

selecting, verbs by analysing them as more deeply embedded under the covert DP THE FACT, which is the true semantically selected argument.

This thesis will argue for an account which is significantly inspired by the Kiparsky and Kiparsky (1971) proposal, but differs from it in suggesting that the extra structure on top of the CP is not the full THE FACT, but simply a definite determiner (Δ) as argued in (Kastner, 2015). This account maintains the advantages of Kiparsky and Kiparsky's proposal of giving a univocal semantics for CPs, whilst also being able to give a compositional derivation for the meanings of these CP embedding definite DPs, and accounting for selectional restrictions and entailment patterns other than those involving factives and *the fact*. In the interests of laying all of the empirical data on the table we will return to this later, to be fully elaborated in chapters 2 and 3.

Possibilities

Fine-grained semantic selectional restrictions extend beyond the widely reported *proposition/fact* contrast however, and crosscut the factive/non-factive distinction. CEVs like non-factive *establish* or semi-factive *discover* are compatible with the DPs *the proposition* and *the fact*, but also with *the possibility*. In contrast neither non-factive *believe* nor semi-factive *find out* are compatible with *the possibility*.

(14) a. Rudolf established the possibility that Chemistry is reducible to Physics.
b. Rudolf discovered the possibility that Chemistry is reducible to Physics.
c. #Rudolf believed the possibility that Chemistry is reducible to Physics.
d. #Rudolf found out the possibility that Chemistry is reducible to Physics.

That this these restrictions crosscut factivity demonstrates that these selectional restrictions cannot be accounted for simply by making a distinction between factives which select for facts and non-factives which select for propositions as done by e.g. Moffett.

Linguistic Material

Furthermore, CEVs relating to transfer of linguistic material such as *whisper/shout/tell* (B. Levin, 1993; Grimshaw, 2015), and verbs related to auditory perception such as *hear* (Higginbotham, 1983), seem to only be compatible with DPs which can be construed as being linguistic in nature, such as *The rumour/theory/story/proposal*, and not with more 'abstract' DPs *The proposition/fact*.

(15) a. Alfred whispered the proposal that the department should be moved.
b. Alfred told John the theory that the stock was undervalued.

c. Alfred heard the story that his grandfather was a war hero.
d. #Alfred whispered the proposition/fact that the department should be moved.
e. #Alfred told John the proposition/fact that the stock was undervalued.
f. #Alfred heard the proposition/fact that his grandfather was a war hero.

The verbs *read* and *write* seem more restricted still, only allowing DP complements which denote linguistic material and can have a salient concrete physical instatiation. Thus *stories* and *proposals* which can be naturally associated with a concrete object, are acceptable, whereas *rumours* and *theories* are generally less acceptable. And of course a fortiori the highly abstract *proposition/fact/possibility* are all also disallowed.

(16) a. George wrote the story that Iraq had WMDs.
b. George read the proposal that war should be declared.
c.???George wrote the theory/rumour that Iraq had WMDs.
d. ?George read the the theory/rumour that Iraq had WMDs.
e. #George wrote the proposition/fact/possibility that Iraq had/didn't have WMDs.
f. #George read the proposition/fact/possibility that Iraq had/didn't have WMDs.

Perception Verbs

"Of course, perception verbs can take events as objects–as in John saw an arriving of Mary ; they can also take facts–e.g., John observed the fact that Mary arrived. It is thus tempting to conclude that perception verbs count among their objects not only events and facts, but also objects different from either. We might use Barwise and Perry's term for this sort of entity and call it a situation." (Asher, 1993)[p20]

(17) a. The dog saw Bill steal the money.
b. The dog saw that Bill stole the money.

Summing up

This evidence shows that CEVs are capable of imposing fine-grained semantic selectional restrictions on the objects that they combine with, restrictions which run far deeper than the widely reported *proposition/fact* contrast. Recall that all of the CEVs discussed above are compatible with an embedded CP.

(18) a. Anna believes that Sweden is nice this time of year.
b. Anna regrets that Sweden is nice this time of year.

c. Anna knows that Sweden is nice this time of year.
d. Anna discovered that Sweden is nice this time of year.
e. Anna established that Sweden is nice this time of year.
f. Anna found out that Sweden is nice this time of year.
g. Anna whispered that Sweden is nice this time of year.
h. Anna told Ed that Sweden is nice this time of year.
i. Anna heard that Sweden is nice this time of year.
j. Anna wrote that Sweden is nice this time of year.
k. Anna read that Sweden is nice this time of year.

If CPs combine with CEVs as their argument in the same way that the above DPs do then they must either denote something which satisfies *any* selectional restriction imposed by any CEV or be many-ways ambiguous between various different types of linguistic, mental, modal, or event-like objects. Note that, as shown by *regret/whisper/tell/hear/think*, the English DP *the proposition* does not satisfy the semantic selectional requirements of every CEV, making it untenable that 'the proposition that P' and 'that P' could have the same denotation when the complement to a CEV.

The alternative is to assume that CPs do not combine with CEVs as direct arguments but through some other means, allowing them to circumvent the semantic selectional restrictions imposed by those verbs on their arguments. This is the basis for the approach undertaken in this thesis. We will consider the alternatives to this view more fully and concretely later in this chapter once the core problem of DP-CP entailments has been introduced.

2.2.3 Variability of attitudinal objects

Moltmann (2003) identifies another observation involving DP and CP complements to CEVs. Sentences like (19), with a free relative DP, are perfectly acceptable, with the reading that John and Mary believe the same thing, which is specified by the subsequent CP.

(19) John believes what Mary believes, namely that it will rain.

These sentences are also possible across distinct CEVs in a manner reminiscent of the quantificational inferences in (5) and (6).

(20) John believes what Mary claimed, namely that it will rain.

However, Moltmann notes that "with sufficiently different attitude verbs, speakers generally evaluate the construction ... as hardly acceptable or at least as a decidedly

funny way of expressing the intended state of affairs."

(21) a. ???John wishes what Mary believes, namely that Bill will be elected president.
b. ???John requested what Mary believes, namely that Sue will study harder.
c. ???John noticed what Mary believes, namely that John said what Mary believes, namely that it is raining.

[examples adapted from Moltmann (2003) [p91]]

As Moltmann notes, judgments vary significantly on the acceptability of these cases, but their awkwardness in comparison to (19) and (20) is surprising, and they are particularly hard to account for under the expectation that the objects of all of the above CEV pairs are the same, namely a proposition.

Similar effects can be observed with the DP *the same thing*.

(22) a. John believes the same thing Mary believes/claimed, namely that it will rain.
b. ???John wishes the same thing Mary believes, namely that Bill will be elected president.
c. ???John requested what Mary believes, namely that Sue will study harder.

Asher similarly points out this odd crossover effect with quantifiers.

(23) a. #John desires everything that Mary believes.
b. #Everything Mary asks for is true.
c. John asks for something that Mary wants.
d. Everything that John believes is true. (Asher, 1993)[p32]

At first glance these observations may appear to be another example of the fine-grained semantic selectional restrictions addressed in the previous section. If *request* and *believe* impose different selectional restrictions, we might predict that the free relative 'what Mary believes' may not be able to denote something which satisfies the selectional restrictions of both *request* and *believe*. (20) in contrast, might be licensed on the basis that some linguistic, representational object like a theory or a claim might satisfy the selectional requirements of both *believe* and *claim*. And indeed distinct verbs within the 'transfer of linguistic material' class seem to be considerably less awkward in this construction.

(24) ?John told Sarah what Mary only whispered, namely that there would be cheese for lunch.

Some subtlety is required here however. Unlike the selectional restrictions discussed

in the previous section, these constructions seem to result in awkwardness, rather than outright unacceptability. Speakers often come to allow these sentences given enough consideration or a clear enough context. They can also sometimes be ameliorated with adverbs like *just* or *only* preceding the second verb.

(25) a. ?John wishes what Mary only believes, namely that Bill will be elected president.
b. ??John requested what Mary just/only believes, namely that Sue will study harder.
c. ??John noticed what Mary just believed, namely that John said what Mary believes, namely that it is raining.

A successful theory of CEVs should ideally provide an account for why these constructions are awkward or disprefered, but not entirely unacceptable and with a recoverable meaning, in contrast to the violations of selectional restrictions addressed in the previous section.

A Note on Eating the same meal

Does the fact that Mary and John can 'think the same thing', or that Mary can 'believe the same thing that John says' show that there must be one token object which is the object of both verbs? Not necessarily, we often use constructions like 'the same thing' and 'whatever' naturally to describe distinct objects which are of the same type.

(26) a. Mary wore the same dress as me.
b. I'll have whatever she's having.

What is important is not that 'the same thing' be an identical token as its anaphor, just that it should share some salient property in common such that qualifies as a member of the same type. And that salient property is highly context dependent. Consider (27).

(27) John and Mary drive the same car.

If we care about organising employees' carpools to work the most salient reading of (27) is one in which John and Mary drive exactly the same token vehicle. If, however, we care primarily about finding replacement parts or a spare tyre for John's broken down car, then the most natural sense of (27) is one in which John and Mary drive distinct cars that are of the same make or model.

In (28), a reading in which the two meals are distinct but are both tokens of the same type is clearly preferred, given our world knowledge that meals can generally

only be consumed once.

(28) a. Mary ate the same thing as John.
b. Mary ate what John ate.

But the single token reading is still possible if we imagine John and Mary either sharing a plate, or more exotically, we imagine that John is a father penguin to the baby penguin Mary, who regurgitates a half digested meal of fish to feed baby penguin Mary.

Asher (1993) also notes that this can be true for definite DPs in general. In (29), we can imagine a context in which John and Mary live in separate houses, with distinct bins, but that they both bring out their respective bin on the same day.

(29) John and Mary both took the bin out on Friday.

The uniqueness of the definite 'the bin' can be satisfied relative to each individual event of taking the bin out, even though there is only one realised DP. For more on this see (Heim, 1990; Elbourne, 2001)

2.3 Substitution Problem(s)

By far the most dominant theory of the semantics of CEVs takes them to denote relations between individuals and propositions, with a CP complement denoting the proposition which is the object of the relation. This is often referred to as the 'standard view' (King, 2002; Moltmann, 2003) or the 'face-value theory' (Schiffer, 2003; Buchanan, 2012), but here we will refer to this view as *Propositionalism*. A well-known problem for Propositionalism, discussed at least since (Prior, 1971), is that of the Substitution Failure of *that P* and *the proposition that P* as the complement to CEVs [6].

Two key commitments of Propositionalism are that CEVs express relations between the subject and a proposition and CP complements are taken to denote the proposition which is the object of these relations. One piece of evidence supporting this picture is the fact that in some contexts we can substitute the CP 'that P' for the DP 'the proposition that P' with no apparent change in meaning:

(30) a. Russell believes that Arithmetic reduces to Logic.
b. Russell believes the proposition that Arithmetic reduces to Logic.

This substitution is accounted for very naturally on a Propositionalist account, if the

[6]Not to be confused with the more famous failure of substitution of identicals in intensional contexts (Frege, 1948)

DP 'the proposition that Arithmetic reduces to Logic' denotes the same object as the CP 'that Arithmetic reduces to Logic', namely the proposition that Arithmetic reduces to Logic.

An old observation however, is that CPs are not always intersubstitutable with apparently coreferential DPs. In particular, substituting 'that P' with 'the proposition that P' does not result in a sentence with the same meaning once we move beyond 'believe' to other verbs.

(31) a. Gödel knows that Arithmetic reduces to Logic.
b. # Gödel knows the proposition that Arithmetic reduces to Logic.

If 'that P' denotes the proposition that P, and 'the proposition that P' denotes the proposition that P, (31-a) and (31-b) have the same structure, and co-referential expressions are intersubstitutable in non-intensional contexts, then (31-a) and (31-b) should have the same meaning. (31-a) and (31-b) do not have the same truth conditions since it is perfectly possible, and historically true, for Gödel to have studied Principia Mathematica without being convinced of its conclusions, making (31-b) true and (31-a) false.

A further side of this substitution puzzle appears when we consider cases where substitution of a CP for a DP does not result in a change in truth conditions but is claimed to result in a change in *grammaticality*, as in (32).

(32) a. Hilbert thinks that Arithmetic reduces to Logic.
b. *Hilbert thinks the proposition/the theory/the fact that Arithmetic reduces to Logic.

A theory which assigns the same denotation to 'that P' and 'the proposition that P' will have some work to do to explain the contrast between (31) and (32).

So substitution of 'that P' for 'the proposition that P' in the complement of a verb results in three difference scenarios based on the verb:

Substitution Succeeds (Believe-Type)

(33) a. Russell believes/accepts/proposed/assumes that Arithmetic reduces to Logic.
b. Russell believes/accepts/proposed/assumes the proposition that Arithmetic reduces to Logic.

Substitution changes Meaning (Discover-Type)

(34) a. Gödel knows/discovered/forgot/reported/expected that Arithmetic reduces to Logic.

b. #Gödel knows/discovered/forgot/reported/expected the proposition that Arithmetic reduces to Logic.

Substitution changes Grammaticality (Think-type)

(35) a. Hilbert thinks/hopes/wishes/said that Arithmetic reduces to Logic.
b. *Hilbert thinks/hopes/wishes/said the proposition/the theory/the fact that Arithmetic reduces to Logic.

The cases where substitution changes meaning are also referred to as substitution failures *salva vertite* or as Prior's puzzle ((Moltmann, 2003) in reference to (Prior, 1971)). Changes of grammaticality are sometimes known as failure *salve congruitate* or as Rundle's puzzle ((Nebel, 2019) in reference to (Rundle, 1968)).

Variations of the substitution problem have been discussed since the 1960's (Hintikka, 1962; Kiteley, 1964; Vendler, 1967; Rundle, 1968; Prior, 1971; Stalnaker, 1976). More recently this objection to Propositionalism has been put forward in (K. Bach, 1997; Moltmann, 2003, 2004a; Harman, 2003; Rosefeldt, 2008; Moulton, 2009b; Elliott, 2017; van Elswyk, 2019), with recent responses defending the standard view including (Moffett, 2002, 2003; King, 2002, 2007; Felappi, 2016; Forbes, 2018; Nebel, 2019; D'Ambrosio, 2021).

We introduced the basic claims of Propositionalism in the introduction, let us reexamine the commitments of Propositionalism more closely to understand why these substitution failures are problematic for the view.

2.3.1 Propositionalism

There are two central questions for the semantics of clause embedding verbs (CEVs) which Propositionalism will decide on: What is the meaning of a CEV? What is the meaning of a CP embedded by a CEV? These questions are obviously interlinked, though it would in principle be possible to agree one point and disagree on another.

In the introduction we identified two key components of the Propositionalist analysis, one concerning the meanings of CEVs and the other the meanings of CPs.

(36) [**Relational Analysis** of CEVs] Clause embedding verbs such as 'know', 'think', 'hope' denote a *relation* between a subject and a proposition.

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[7]I use 'subject' here rather than 'agent' in the hope that this account can also cover cases of CEVs with non-agentive subjects. Given the focus on 'attitudes reports' it is not unreasonable that attention is usually only paid to agentive subjects, though we should note that CPs can be embedded by verbs with non-agentive subjects, and we might plausibly hope for an account of

(37) [**Propositional Reference** of **CPs**] 'That P' denotes the proposition that P.

In order to derive the 'problem' of the substitution problem this must be augmented with fairly uncontroversial assumptions about compositionality and the substitution of co-referential expressions in non-intentional contexts. But there is another missing premise needed in order to derive the co-referentiality of 'that P' and 'the proposition that P'

(38) [**Propositional Reference** of **the proposition**] 'the proposition that P' denotes the proposition that P.

(38) may seem so banal as to be not worth mentioning, and its denial seems to have an air of 'absurdity' (Nebel, 2019), and yet I will argue in the following sections that there are good reasons to disbelieve it.

If any one of these four claims were wrong then the Propositionalist prediction that Discover-type and Think-type substitution failures should not arise could be avoided, and so responses have been constructed which attack each one of these assumptions. I will begin by casting doubt on (38) as a way to motivate a move away from thinking about the substitution problem as a problem per se, but as one particular instance of wider set of observations about the entailment patterns of DP and CP embedding, which are puzzling not only for Propositionalism but also for several suggested modifications and responses of it which attempt to do away with the substitution problem. The behaviour of CEVs with DPs other than 'the proposition' has been underanalysed as a consequence of the framing of this substitution behaviour as a 'problem' for propositionalism and the empirical phenomenon can be seen more clearly by exploring the entailment patterns described in (Uegaki, 2015a).

The focus of the rest of this chapter will be to show that no modification to these Propositionalist claims is able to account for the all of the empirical phenomenon we have introduced.

2.3.2 Naive Polysemy

Might CEVs simply be polysemous between a DP taking and a CP taking version? That is, might we simply have two distinct (but perhaps interrelated) lexical

the semantics of CEVs and CPs to be extendable to such verbs (Anand, Grimshaw, & Hacquard, 2017):

(i) a. Bad weather means that our train will be delayed.
b. Utilitarianism entails that we should harvest organs from non-willing donors.
c. The principle of alternate possibilities implies that moral responsibility and freedom are linked.

entries for verbs like *believe*, one of which is defined for e-type objects denoted by DPs and the other for $\langle s, t\rangle$-type objects denoted by propositional CPs?

If this were the case, a standard test we would expect coordinations between DPs and CPs in the object of a CEV to be ungrammatical, or at the very least zeugmatic (Moltmann, 2003). But as has been observed by almost every commentator, this is not the case (King, 2002; Moltmann, 2003; Nebel, 2019; D'Ambrosio, 2021; Güngör, 2022).

(39) a. John believes Mary's theory and that that isn't the only thing she's right about.
b. John discovered Mary's deception and that she had been lying about other things too.

(39) should only be possible if humourous if the DP and CP taking CEVs were polysemous as in (40)

(40) She grew avocados and bored.

This gives us at least an initial reason for rejecting a polysemous account, since it fails the best test we have for this phenomenon, but we should also disprefer polysemous accounts in general. Invoking polysemy gives up on explanatory value. We could do this every time we encountered an unusual pattern in word behaviour or verb complementation specifically, but unless this comes with a very well supported mechanism for relating the two (or more) meanings, as discussed in Theiler et al. (2016), then we have no explantion as to why there should be this explosion in lexical entries for verbs which seem on the surface to have the same core meaning, or in the case of these CEVs, exactly the same meaning if the coordination tests are taken as reliable.

In the next section I will explore a best attempt at making such a polysemous account work, but show that the entailment patterns and inferences discussed in this chapter also evidence against this style of view.

2.3.3 Polysemy Conditioned on Syntactic Category

One way out of the substitution puzzle would be to deny the *structural equivalence* of CEVs embedding CPs and DPs. This approach is taken by King (2002), who argues that CEVs are polysemous between a CP taking and DP taking denotation. There are two parts to his account, one addressing the failures salva veritate and the other the failures salva congruitate.

To deal with the failures salva veritate with the Discover-type verbs, King proposes that when a CEV combines with a CP it has it's standard propositionalist

meaning, taking a proposition as its object, but that the same discover-type verb can have an alternate meaning when combining with a DP complement, taking a conventional individual as its object. The substitution failure in (41) is unsurprising then, since they involve two distinct verb senses.

(41) a. Kurt discovered that Arithmetic reduces to Logic.
b. Kurt discovered the proposition that Arithmetic reduces to Logic.

Nebel (2019) argues for a related solution to the salva veritate failures, wherein CEVs are polysemous between a proposition taking, CP embedding version, and a concealed question taking, DP embedding version[8].

However, if *discover* were genuinely polysemous we would not expect it to be possible to coordinate a DP and CP as the object, and yet this is in fact possible.

(42) John discovered her theory and that it is incorrect.

Ungrammaticality

Syntactic selection for a specific category even when there are plausibly semantically synonymous items available of another category is invoked to explain the distribution of complements to several verbs. For example 'ask' and 'inquire' contrast in that though both s-select for a question, 'inquire' is compatible with interrogative clause complements only, whereas 'ask' allows the question to be realised either as an interrogative clause or as a DP denoting a (concealed) question (Grimshaw, 1990):

(43) a. He inquired when the men would arrive.
b. *He inquired the time of the men's arrival.
c. *He inquired a question.

(44) a. He asked when the men would arrive.
b. He asked the time (?of the men's arrival).
c. He asked a question.

King (2002) argues that the same can be said of *believe*-type and *think*-type verbs. Both s-select a proposition, but though 'believe' is compatible with DP and CP complements, 'think' is compatible only with CPs.

(45) a. He believes that the men will arrive on time.
b. He believes the theory that the men will arrive on time.

[8]Nebel does provide an analysis distinct from King's with respect to the substitution failures salva congruitate, which we will address in the next section.

(46) a. He thinks that the men will arrive on time.
b. *He thinks the theory that the men will arrive on time.

The failure to preserve grammaticality when substituting 'that P' for 'the proposition that P' would then be simply a matter of syntactic selection, and do no harm to the propositionalist's theses of propositional reference for CPs and a relational analysis of CEVs. Felappi (2016) describes this syntactic solution as 'the usual way out' of substitution problems.

However, as King (2002) himself acknowledges, this claim does not quite capture all of the empirical observations. 'Think' is indeed not compatible with many lexical DPs such as 'the claim' or 'the proposition', but it is compatible with *-thing* quantifiers.

(47) Donald thought/dreamed/hoped/wished something/anything/nothing.

King's response to this worry is to argue that given how restricted this class of exceptions is, we might reasonably conclude that these -thing quantifiers are somehow *special* in being able to quantify over DPs and in special circumstances CPs. This 'special' semantics for quantifiers is not in itself implausible, and similarly 'special' semantics have been proposed in alternate solutions, with quantifiers ranging over properties (Moltmann, 2004b; Elliott, 2016), or distinct thematic positions (D'Ambrosio, 2021). However, it is one thing to propose a special semantics for *something*, but quite another to propose that it is not syntactically a DP. In fact *something*, displays exactly the distribution we would expect of a DP in every other context, failing to appear embedded by an adjective or noun, and appearing as the complement to a preposition, in contrast to CPs.

(48) a. It is unfortunate that we ended up here/*something.
b. I am happy that we ended up here/*something.
c. The rumour that we ended up here/*something ...
d. He asked about something/*that we ended up here.

There are also further counterexamples to the claim that *think*-type verbs cannot embed DPs. 'Think', 'hope', and 'wish' also allow for 'the same thing':

(49) Donald thought/dreamed/hoped/wished the same thing every morning.

Relatives:

(50) Donald thinks/dreams/hopes/wishes whatever he is told to.

DP proforms:

(51) Donald thought/dreamed/hoped/wished that/it too.

and Cognate objects:

(52) a. Donald thought an interesting thought for the first time in his life.
b. Donald hoped a hope.
c. Donald dreamed a dream.
d. Donald wished a wish.

Note again that all of these constructions, unlike CPs, demonstrably do have the syntactic distribution of DPs and not of CPs.

(53) a. It is unfortunate *something/*whatever he said/*it/that we ended up here.
b. I am happy *something/*whatever he said/*it/that we ended up here.
c. The rumour *something/*whatever he said/*it/that we ended up here ...
d. He asked about something/whatever he said/it/*that we ended up here.

These verbs DO select for DP arguments, they just have verb specific selectional restrictions on which individuals they can combine with. That they readily combine with highly semantically bleached DPs like -thing quantifiers 'something/anything/nothing' and relatives 'what(ever) he wants to' is therefore not surprising.

2.3.4 Incoporated Prepositions

Nebel (2019) argues that failures of substitution salva congruitate can be understood as being generated by syntactic constraints in English against the appearance of DPs in certain environments.

He points out that in the complements to adjectives CPs are possible but DPs are not, even for example the one a Propositionalist would most expect to be viable namely, 'the proposition'.

(54) a. Sally is happy/angry/afraid that Fido barks.
b. *Sally is happy/angry/afraid the proposition that Fido barks.

A classic analysis of this phenomenon is that DPs are not licensed in this position because they cannot be assigned case by the adjective. CPs on the other hand, which do not require case, are perfectly possible.

Nebel suggests that this account could be extended to understand the 'ungrammaticality' of the 'hope'-type verbs which were claimed to be ungrammatical with

DP complements. These verbs are analysed as having an incorporated preposition, which only surfaces with a DP argument, but must be supressed for CP arguments because of the idiosyncractic proscription in English against CP complements to prepositions ('*P CP').

When the suppressed preposition is given overtly the V *DP examples become grammatical.

(55) a. John thought/dreamt **of** the proposition that Fido barks.
b. John hoped/wished **for** ?the proposition/the result that he would be made captain.

This proposal has some initial plausibility. Similar arguments are made for the use of the preposition 'of' as a semantically vacuous tool for fulfilling syntactic category/case requirements in complex event nominalisations (Grimshaw, 1990).

However there is direct evidence against this proposal. Firstly, as noted in previous sections, CEVs in the *think* class are in fact compatible with certain DPs, in particular quantifier + thing and cognate objects, without the support of a preposition. We would need to appeal to the special status of such constructions as in Elliott (2017), which we will discuss and reject later.

(56) a. John thought something wild.
b. John thought a happy thought

Secondly there is clear evidence that these supposedly suppressed prepositions are not in fact simply structural and semantically vacuuous as in Grimshaw (1990), since in cases where a DP object is possible either with or without a preposition, we get a difference in interpretation.

(57) a. John thought something, namely *Chomsky's theory/that Chomsky was wrong about case theory.
b. John thought of something, namely Chomsky's theory/*that Chomsky was wrong about case theory.

The spelling out of what is denoted by 'something' in (57) is only possible with something like a proposition when not accompanied by a preposition, vs something like an ordinary object denoted by a DP when the preposition 'of' is used.

(58) a. John dreamt a happy dream.
b. John dreamt of a happy dream.

(58-b)

can only be referring to John having some second order dream about another dream (which was happy). His actual dream may itself not be happy, as he may for example be regretful about a time where he could achieve his happy dreams, whereas in (58-a) his (first order) dream must be happy.

This suggests that Nebel is wrong to say that these prepositions are just structural, since they can clearly have semantic weight. In fact, a path which has been explored but will not be pursued in this thesis construes the job of such prepositions as precisely to identify a *RES* argument of the CEV, as distinct from it's direct object, see (Kratzer, 2006; Moulton, 2009a; Moulton & Han, 2018).

Distinct Thematic Roles

Forbes (2018) gives a systematic version of this analysis, where clausal complements are associated with a CONTENT thematic role, and DPs are associated with a THEME thematic role, and related to a monadic verb in a neo-davidsonian style. This picture is also adopted by (D'Ambrosio, 2021). They therefor don't predict that there should be legitimate substitutions between DPs and CPs, since they occupy distinct thematic positions.

This neo-davidsonian approach has another advantage over the polysemy approaches in that it preserves a single meaning for the verb, with different readings being derived from the different relations that DPs and CPs are assigned respectively by the thematic heads which relate them to the verb.

However this analysis introduces its own problems. Unlike the neo-davidsonian approach to CEVs adopted by Elliott (2017), this proposal relies on a syntactic contrast between DPs and CPs, which runs against the claims of D'ambrosio that DP quantifiers can quantify into the position introduced by a CP taking CONTENT thematic head (D'Ambrosio, 2021). For similar reasons such an analysis must find it very hard to explain that DPs and CPs, which are taken to be marked for different theta-roles can be coordinated in the object of a CEV.

(59) John discovered her theory and that it is incorrect.

No other two theta-roles can be coordinated in this way, plausibly because doing so would result in a violation of the theta-critereon (Chomsky, 1993). Consider for example benefactives or recipients, which can appear with another THEME DP, but not coordinated.

(60) a. Mary baked John a cake.
b. #Mary baked John and a cake.
c. Mary gave John a book.
d. #Mary gave John and a book.

Blocking the substitutions with *discover* has the undesirable side effect of also leaving unexplained the substitution successes with believe, though the route is presumably open to suggesting that in these exceptional cases a CP may be assigned the same thematic-role.

The leading insight of this approach is that CPs are not the objects of CEVs, they describe their content. Capturing this insight using a distinct thematic role CONTENT for CPs (and some light DPs) is theoretically undesirable since this thematic role would have to have features that mean it does not fit into our existing understanding of the Theta-system. It can be coordinated with a distinct theta-role, it appears lower than a THEME argument, and it is oddly 'dependent' on another thematic role. It 'characterises the content' of an individual in a distinct thematic position.

This insight can be captured in the system we adopt later in the thesis which treats CPs directly as predicates, which can combine with a verb with an internal argument through RESTRICT.

2.3.5 Why The proposition that P is not the proposition that P

The English DP *the proposition that P* is sometimes taken to be privileged as a DP which can have as it's semantic value a proposition (King, 2002). But, as (Moltmann, 2013) observes, the noun 'proposition' used in this context is at best a semi-technical piece of jargon, and we have no right to expect that this English noun will behave the same way as what is meant metalinguistically in this thesis as the meaning of a sentence. Moltmann (2004b) describes these metalinguistic descriptions of semantic objects as 'reifying' when we attempt to use them in the object language (Moltmann, 2004a). We can see that trying to treat our metalinguistic DPs this way results in a huge range of 'subsitution problems' that go far being just 'the proposition that P'

Predicative Noun Phrases

(61) a. Elizabeth is the queen.
b. # Elizabeth is the function which returns true when given an input which has the property of being the queen and false otherwise.
c. # Elizabeth is the singleton set of queens in this context.

(61-b)

and (61-c) do not have the same meaning as (61-a). Elizabeth is not a function

or a set, she is a queen.

Intensional Transitives

(D'Ambrosio, 2021)

(62) a. Sally seeks a unicorn.
b. #Sally seeks the generalised quantifier denoted by "a unicorn".

Sally doesn't seek a generalised quantifier, she seeks a unicorn.

Properties

(Moltmann, 2003, 2004b)

(63) a. John is wise.
b. #John is the property of being wise.

John isn't a property, he is wise.

'Propositional' Attitude Reports

(64) a. Galileo believes that the Earth moves.
b. #Galileo believes the meaning of the sentence "The Earth moves.".
c. #Galileo believes the set of worlds where 'The Earth moves' is true.

These 'substitution failures' should not be so shocking to us. We have no right to demand of English DPs that they denote in the object language what our meta-language stipulates them to be. We're holding the noun 'proposition' to a higher standard than we do other nouns.

So why are we holding 'the proposition that P' to such a high standard? I suspect that there is an implicit theory of the semantics of noun complement clauses at work here. If we think that in 'the proposition that P', the DP 'the proposition' and the CP 'that P' are in apposition with each other, i.e. that they are alternative descriptions of the same object, then we're pushed much closer to accepting the propositional reference of this DP. In chapter 3 I will address this analysis and demonstrate how it is mistaken.

So is all well for Propositionalism then? If we simply abandon the claim that 'the proposition that P' denotes the proposition that P, can we maintain the view that CEVs denote relations to propositions when they have CP complements, doing away with the substitution problem?

Not quite. What the substitution problem and the various responses to it reveal is that there is a tension between DP and CP arguments to CEVs. Should we

treat CEVs in the hintikkan way and assume that they fundamentally relate to propositions? If so then we will need to capture their meanings with DP arguments through some other means, with type-shifting as the most plausible candidate. As we shall see in the following section though, this type-shifting approach will not allow us to capture the behaviour of DP arguments in a satisfactory way.

2.4 Type Shifting

In this section I will briefly consider two variations of a type shifting approachs. These approaches are prima facie inviting, since they may offer an off the shelf and independently motivated (in other domains) mechanism for having a single, non-polysemous, entry for a verb being compatible with both DPs, which are prototypically e-type, and CPs, which are prototypically $\langle s,t\rangle$-type.

In addressing problems in other domains, type shifting has been invoked as a last resort mechanism used to get events denotations from items that would prototypically, and according to this approach basically, have individual denotations (Chierchia, 1989; Pustejovsky, 1998, 2012; Potts, 2002; Uegaki, 2015b)

However, either of the two available options, namely sometimes shifting objects to propositions ($e \rightarrow \langle s,t\rangle$) or shifting propositions to objects ($\langle s,t\rangle \rightarrow e$), can be rejected on the basis of evidence we have already considered in this chapter.

2.4.1 $e \rightarrow \langle s,t\rangle$

An approach which is taken more or less implicitly in some philosophical literature is to take some DPs, particularly as the complements to CEVs, as having been type-shifted from an expected e-type denotation into a propositional $\langle s,t\rangle$one(K. Bach, 1997; Buchanan, 2012; Burge, 1980). This is often supported by an *appositional* analysis (De Cuba, 2006, 2017; King, 2002) of DP CP complementation in which the DP 'the theory' and CP 'that the sun revolves around the Earth' are taken as codenoting the same proposition in an appositional relation in (65)

(65) John believes the theory that the sun revolves around the Earth.

We shall discuss and ultimately reject this appositional approach to DP-CP complementation in the following chapter, but let us assume for now that it or some independent reason lends some plausibility to the possibility of some DPs in some contexts having an $\langle s,t\rangle$denotation.

The first problem for this view is that if the type shifting mechanism is freely available, then we would not expect substitution failures salva veritate in the 'discover'-class verbs. If 'the theory' can have the same denotation as 'that the sun revolves

around the Earth' then why can (67-a) not be paraphrased by (67-b) as (66-a) can be by (66-b)

(66) a. John believes the theory that the sun revolves around the Earth.
b. John believes that the sun revolves around the Earth.

(67) a. John knows the theory that the sun revolves around the Earth.
b. John knows that the sun revolves around the Earth.

Perhaps there is some way to have type-shifting be unavailable for the *discover*-type cases, maybe by combining this type shifting approach for *believe*-types with a polysemy account for *discover*-types, in which type-shifting does not apply since it is only used as a last resort mechanism to resolve type clashes, whereas there is an acceptable DP reading available.

However, even if we adopted something like this approach there is still a problem from within the most plausibly type shifted *believe* verbs. Type-shifting is fundamentally coarsening. That is, information is lost by shifting from a DP to a CP. DPs like 'Copernicus's theory' contain information, presumably about the origin, possessor, or famous promulgator of the theory, which is not present in 'that the Earth revolves around the sun'. If DPs simply denoted their propositional content when objects of CEVs (even if only in a sub-class of them like *believe*) then we would explect (68) and (69) to have the same interpretation.

(68) John believes Copernicus's theory (that the Earth revolves around the sun)

(69) John believes Aristarchus of Samos's theory (that the Earth revolves around the sun).

And yet it is perfectly possible for John not to be in a position to believe anything of Aristarchus of Samos, if he is unaware of his existence, despite the fact that unbeknownst to John, his and Copernicus's theories have the same content as elaborated by the attached CP.

Given that $e \rightarrow \langle s,t \rangle$ type shifting cannot even make sense of its supposed 'easy' cases, we will reject it here, though it will also be addressed in the specific case of DP-CP complementation in the Chapter 3.

2.4.2 $\langle s,t \rangle \rightarrow e$

The inverse correlate to the $e \rightarrow \langle s,t \rangle$ type shifting approach would be to have typically $\langle s,t \rangle$denoting CPs be type shifted under certain circumstances to denote individuals. This approach has the advantage of simplicity over polysemous accounts in having all CEVs, and in fact in most versions all transitive verbs, take

type e arguments. This approach is taken in (Chierchia, 1989) and (Potts, 2002). Propositions are type shifted into 'individual correlates' of propositions which may be 'states of affairs' (Chierchia, 1989) or 'facts' (Fine, 1982).

The major advantage over the $e \rightarrow \langle s,t \rangle$ approach is that this picture correctly predicts the lack of entailment or paraphrase for the *discover*-verbs as in (67-a)-(67-b). By treating the CP as denoting an individual in these cases the semantics is fine-grained enough to distinguish between for example 'Copernicus' theory that P' and '(the fact) that P'.

However, this comes at the cost of now predicting the same lack of entailment for the *believe* verbs, in contrast to what we observe as seen in 2.2.1 and 2.3.1.

Note that in this case a hybrid polysemy-when-type-shifting-is-is-not-required is a less plausible patch. We might want to say that $\langle s,t \rangle \rightarrow e$ type-shifting happens in the *discover* class because they are incompatible with $\langle s,t \rangle$complements, but not in *believe* verbs since they do have a possible $\langle s,t \rangle$complement. But we also know that they must have a possible type e complement, since straightforward DP complements are also possible. Not only do we then no longer have an explanation for the successful entailments in those cases (as we shall see in the following sections) but we would have to resort to some version either of $e \rightarrow \langle s,t \rangle$ shifting or polysemy to account for the *believe* type verbs which leave us with all the same problems as discussed in 2.4.1. and 2.3.3. AND with no meaningful explanation for why some verbs but not others behave this way.

All this said, I will argue that this approach, as given in Chierchia (1989); Fine (1982); Potts (2002), is very much on the right track with respect to an explanation of the behaviour of *discover* type verbs. Apparent CPs do in certain circumstances end up with type e, denotations, and this explains their subsititution failures salva veritate. The issues with *believe* type verbs derive from a lack of any clear mechanism for restricting general type shifting from taking place.

What we need then is a mechanism for getting the type of 'individual correlates' or 'facts' from this approach without appealing to a rescuing, type-shifting operation. The approach I will adopt in chapter 4 does this with a covert determiner whose role is to take a CP and return the desired individual, and whose use is governed by rules for selecting definite vs indefinites already in place in the rest of the grammatical system. For now though, we will stay with puzzles in need of explanation and build up to their solution across the next two chapters.

2.5 Entailment Patterns

The literature around substitution failures is complicated by the fact that most approaches are either arguing for or reacting against the default assumption of

Propositionalism. Substitution problems are 'problems' and not simply 'puzzles' or 'patterns' because they cut against the default view. However, what makes the substitution problems with 'the proposition that P' so compelling is that in some places (e.g. the *believe* verbs) the substitution IS possible, as the Propositionalist view would expect. If this were not the case then we could either adopt a polysemous account or $\langle s, t\rangle \to e$ type shifting and have no sematically complex puzzle to deal with.

Given the very real semantic puzzle, and hoping to avoid neadless complexity from arriving at the puzzle from the perspective of being for or against Propositionalism, for the rest of the thesis I will reframe what I take to be the fundamentally interesting observations from the substitution problems in terms of entailment patterns, bringing it in line with the phenomena discussed by Uegaki (2015a).

First notice in the cases of substitution *successes*, it's not just 'the proposition that P' which can substitute for 'that P', there is an entailment from 'A vs DP that P' to 'A vs that P', for any DP-CP that the verb can take as an object. This entailment does not hold for verbs like 'know' which result in substitution failures. Whatever else might be involved in sameness of meaning, for two sentences to have the same truth conditions they must at least be mutually entailing. The failure of entailment in this class of predicates is therefore another symptom of a failure of substitution salva veritatae, but though here the fact that verbs can pattern differently means there is still an empirical phenomenon which cries out for explanation, whether or not we persuade ourselves we don't have to care about the substitution puzzles once we abandon our naive semantics for 'the proposition that P'

Uegaki (2015a) identifies a puzzle here wherein some verbs, but not others, universally licence an entailment from 'A vs DP that P' to 'A vs that P', for any DP object they take.

Believe-type

Some predicates are grammatical with both DP and CP complements and they licence an entailment from X Vs DP that P to X Vs that P.

(70) John believes/assumes/asserts the rumour that P
⊩ John believes/assumes/asserts that P

Know-type

Some predicates are grammatical with both DP and CP complements but there is no entailment from X Vs DP that P to X Vs that P.

(71) John knows/discovered/reported the rumour that P

⊮ John knows/discovered/reported that P.

2.5.1 Think-types

As we have argued, the salva congruitate failures are more properly analysed as failure to meet a selectional restriction, rather than ungrammaticality. We can therefore ask the question of whether or not they licence the entailment when they combine with the only CP embedding DPs they combine with, cognate objects.

When they do combine with their cognate objects then they pattern with 'believe' below.

(72) a. John thinks the thought that P
⊩ John thinks that P
b. John hopes the hope that P
⊩ John hopes that P

So they are actually also members of the *believe* class, in the sense that they license the entailment from X Vs DP that P to X Vs that P for every 'DP that CP' that they combine with, it's just that they only ever combine with one CP taking DP, their cognate object.

Note we should not thereby erase the class of verbs which genuinely do not take DP complements of any kind. These include, *agree, complain, vouch, reason, care, disapprove, reckon, speculate, insist, pray.* These will require their own explanation, which we will undertake in chapter 5, but we shall leave them aside for now, as it is impossible to define whether or not they licence the entailments we care about here.

This way of reframing the 'substitutions' in terms of the existence or lack of entailments is neutral with respect to philosophical commitments we might have with respect to Propositionalism, and allows us to see the broader landscape of DPs embedded by CEVs instead of hyperfocusing on the noun 'proposition', or on a good day including the noun 'fact'.

2.5.2 Summing up

There are two classes of predicates:

- *believe*-type predicates which licence an entailment from X Vs DP that P to X Vs that P.
{*assume, assert, believe, establish*},
with the *think*-type subclass[9]: {*allege, claim, conclude, feel, hope, say, think,*

[9]which only allow a cognate object as a DP complement, but in those cases that DP complement can always be modified by a 'that'-clause, and the entailment always goes through

wish, guess, prophesise, predict}

- *know*-type predicates which do not licence an entailment from X Vs DP that P to X Vs that P. {*convey, discover, doubt, forget, guess, know, learn, regret, remember, report*}

As Uegaki notes the operative distinction cannot be factivity since there are non-factives in the *know*-class, such as *report* and *convey*. It is interesting though, that while not all of the *know*-class are factives, all of the factives are in the *know*-class.

Uegaki suggests that the differences in entailment patterns can be explained in terms of rogativity, whether or not the predicate can embed an interrogative clause. Know-type verbs, he argues, are all responsive, they embed both declarative and interrogative clauses (Lahiri, 2002), whereas all of the believe-type verbs are anti-rogative. However, there are counterexamples to this proported disnction as well, suggesting this explanation cannot be fully correct. *Anticipate, acknowledge, stress, highlight,* and *show* are all verbs which fail to licence the entailment and are therefore know-type, and yet all are anti-rogative.

The relevant contrast, I suggest, is not factivity or question embedding, but *presuppositionality* in the sense of (Kastner, 2015). Know-type verbs necessarily make reference to a claim or fact that is in the common ground and so not-at-issue, whereas believe-types are not necessarily responsive to a pre-existing claim in this way.

In the following chapters I will show how the entailment properties of presuppositional and non-presuppositional CEVs follow from independently motivated syntactic and semantic properties. Non-presuppositionals combine with their CP by the RESTRICT operation, resulting in a meaning that can be paraphrased as 'John believes something whose content is P'. Presuppositionals on the other hand, combine with definite DCPs rather than bare CPs, resulting in a meaning paraphrased as 'John knows the particular individual in the common ground with content P'.

In order to show how these respective meanings can be derived however, we first need to start by understanding the semantics of the object in the antecedent of the entailment, DNCPs. In the following chapter we will address the question of the structure of DNCPs and how the noun relates to its so-called 'Noun Complement Clause' (NCC). We will then see how the predicativist semantics for NCC can be straighforwardly extended to the CP objects of CEVs, in a way which predicts the entailment with this class of verbs. However we shall also see that this view incorrectly predicts that the same entailment should hold in the know-class, if they are taken to have the same compositional structure. This motivates our turning to the compositional semantics of presuppositionals, where I show how they can combine with a DCP through SATURATE, which blocks the entailment from 'A

vs DNCP' to 'A vs CP'.

We need to divert through two more chapters about the behaviour of CP and DP complementation before we are in a position to fully answer all of these puzzles though.

2.6 Empirical problems for theories of CEVs

For convenience, the puzzles we will take as desiderata for a theory of CEVs are summarised here:

Inferences with Quantifiers

(73) George believes that P ⊩ George believes something.

Fine-grained Selectional Restrictions

(74) a. Laura believes the story/proposition/*fact/*possibility that P.
b. Alfred knows the story/proposition/fact/possibility that P.
c. George wrote the story/*proposition/*fact/*possibility that P.

Variability of Attitude Objects

(75) ???John wishes what Mary believes, namely that Bill will be elected president.

Entailment Patterns

(76) a. Russell believes DP that P ⊩ Russell believes CP.
b. Russell discovered DP that P ⊮ Russell discovered CP.

Chapter 3

Restriction and Noun Complement Clauses

3.1 Introduction

In Chapter 2 we saw that individuals, typically denoted by DPs, must be the semantic arguments of clause embedding verbs (CEVs). I also raised a puzzle involving entailment patterns with so-called noun complement clauses (NCCs) like 'the rumour that Fatima is a thief'. In this chapter we will look more closely at the structure and semantics of NCCs in order to understand how they fit into the entailment puzzle.

The implicit analysis we identified as being an intuitive motivation for the substitution puzzle in chapter 2, where NCCs like 'the proposition that P' denote the same object that 'the proposition' or 'that P' denote individually, has been implemented explicitly in several linguistic theories. I will call this the *Appositional* analysis of NCCs. An early version of this view was suggested in (Stowell, 1982), and more modern approaches have been advanced in (De Cuba, 2017; Hankamer & Mikkelsen, 2021).

I will argue against a traditional view under which NCCs are treated as appositional (Stowell, 1982; Delacruz, 1976), and I will introduce evidence from copular clauses to demonstrate that the relationship between the nominal and clause in NCCs cannot be identity, as has been argued in some recent proposals (De Cuba, 2006; De Cuba & MacDonald, 2013; De Cuba, 2017; Hankamer & Mikkelsen, 2021). Instead, I will follow a recent view originating in Kratzer (2006) and since developed further by many others (Moulton, 2009b, 2015; Bogal-Allbritten, 2016; Elliott, 2016, 2017; Bondarenko, 2020, 2021b) which analyses TCs as predicates which combine with nouns in NCCs through restriction.

We will then see how this analysis extends to clauses embedded by verbs directly,

by restricting the internal argument position. We will then see how the resulting picture deals very well with most of the puzzles set out in Chapter 1, deriving the inferences with quantifiers, selectional restrictions and variability of attitudinal objects, and correctly predicting the entailments of *believe*-type verbs. However, we shall also see how this account must be missing something, since it incorrectly predicts the entailment of *discover*-type verbs. This will lead us onto the analysis of CPs embedded under *discover*-type verbs in chapter 4.

So-called 'noun complement clauses' (NCCs) involve a that-clause embedded under a noun to form a larger DP (DNCP).

(1) The rumour that Fatima is a thief ...

Why should we care about these constructions in order to understand the semantics of clause embedding verbs? We have already seen that these DNCPs can be the objects of CEVs, and that when they are, they can license or fail to license an entailment to the verb when it directly embeds a CP.

(2) John believes the rumour that Fatima is a thief.
⊩ John believes that Fatima is a thief.

(3) John discovered the rumour that Fatima is a thief.
⊮ John discovered that Fatima is a thief.

It is therefore worth spending some time to understand how NCCs relate to the DNCPs they are embedded within. The two leading proposals for this relationship are *identity* and *predication*. In this chapter I argue against the *identity* proposal by showing that DPs and CPs *can* be related by identity in copular clauses and *namely* appositions, but that different DPs appear in these constructions from DNCPs, therefore the relation DNCPs cannot be the same as in these constructions.

Might it be that structure and meaning of clauses in NCCs differs fundamentally from clauses embedded under verbs? A number of recent proposals argue that this in fact the case (Kayne, 2010; Arsenijevic, 2009; Haegeman, 2012). These authors propose that the clauses in NCCs differ from VCCs in that NCCs are actually disguised relative clauses. If this were true then we would be entitled to ascribe a different semantics to NCCs and VCCs. NCCs might, for example, denote predicates as relative clauses do, whereas VCCs might denote individuals of the sort that could be the internal argument of a CEV.

This would make the successful entailments with *believe*-type verbs surprising, since there is no straightforward relationship between a NCC relative clause and the VCC, but this does not rule out the possibility that a relative clause account could derive the relationship in the right way. It is worth some time then to consider

these proposals. I will use arguments presented in De Cuba (2017) to show that such a distinction between VCCs and NCCs is very hard to maintain in the face of empirical evidence.

3.2 Identity and Apposition

As an alternative to the relative clause analysis, a number of traditional proposals analyse NCCs as appositions (Stowell, 1982)[1]. Moulton (2009b) Rejects this view on the basis that NCCs do not display the right intonation patterns for appositives. Apposition in English is accompanied by pauses on either side of the appositive, represented orthographically with commas (Kim, 2014). This intonation pattern, and it's associated commas, are not observed in NCCs.

(4) The prime minister*(,) Boris Johnson*(,) decided to pass the bill.

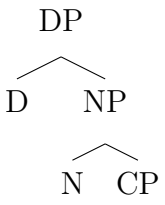
(5) The rumour(*,) that Fatima is a thief(*,) surprised absolutely no-one.

Another objection is that, given that the TC would be in apposition to the DP *the rumour*, not just the NP *rumour*, this analysis makes a claim about the constituent structure of these constructions. If Stowell's appositive analysis is correct we would expect the noun and determiner to form a constituent before combining with the NCC, since the clause is not in apposition to the property denoting NP, but the individual denoting DP. Yet DP proforms cannot take NCCs[2].

(6) a. *It that Fatima is a thief...
b. *This/that that Fatima is a thief...

This is exactly as expected if the true constituent structure of DPs with NCCs is as in (7), contra Stowell's appositional analysis.

(7)



[1]Also see Huddleston and Pullum (2002)[p947] and Hankamer and Mikkelsen (2021), and references therein.

[2]There is an interesting construction in English where this string is possible.

(i) John believes it that he won't get the job.

This construction is interesting in it's own right, but the fact that it is so restricted in use suggests that it requires a distinct analysis from the NCCs we address here (Djarv, 2021).

I agree with Huddleston and Pullum (2002) and Moulton (2009b) that these are already compelling enough reasons to reject Stowell's original proposal, but a more charitable modification might not take the core of this proposal to be that NCC are structurally identical to nominal appositions in English. Instead the claim would be that the relationship between the DP and the clause is the same as that between two DPs in apposition, namely identity. This proposal is explicitly implemented by De Cuba (2017) and in a different guise in Hankamer and Mikkelsen (2021). It is worth taking this type of modified apposition-style analysis a little more seriously, even though I will argue that this too must be rejected.

In nominal appositions such as (8) the relationship between the DPs is identity (Meyer, 1987; Huddleston & Pullum, 2002; Kim, 2014).

(8) The greatest Italian tenor, Pavarotti, will be returning to Palermo.

The greatest Italian tenor and *Pavarotti* are co-referential, they refer to the same person. We should consider the possibility then, along the lines of De Cuba (2017) and Hankamer and Mikkelsen (2021), that this is true of the individual denoted by *the rumour* and a putative individual denoted by *that Fatima is a thief.*

There is some support for this claim from the fact that constructions with 'namely', available with nominal apposition as a way to make the relation explicit, are possible with some DPs and CPs.

(9) a. The president, namely Bill Clinton, asked to be shown some leniency.
b. John heard a terrible rumour, namely that Bill was likely to be fired.

It is fairly uncontroversial that the relation between the two elements in an explicit *namely* apposition is identity (Meyer, 1987).

A further parallel with nominal apposition is that these same DPs can appear across a copular clause from a CP, just as the DPs in a nominal apposition can.

(10) a. The president is Bill Clinton.
b. One terrible rumour is that Bill is likely to be fired.

There is need for caution here though. Copulas come in several different flavours and can express different relations, identity or predication. They are therefore worth examining in more detail to decide what examples like (10) really show us.

The following section will look at copular clauses with post-copular CPs in more detail, in order to establish what the relationship between a DP and CP is in copulars. I will show, following Potts (2002), that these copulas express the identity relation. I will then argue that since different DPs appear as pre-copulars in these constructions from those that appear in NCCs, the relationship between a DP and

NCC *cannot* be identity. This will then lead us onto what this thesis will argue to be the correct analysis of NCCs, that they are predicates which combine with a noun through restriction.

Equative Copular clauses and explicit namely appositions pattern together, against DNCPs. The appositional analysis is incorrect.

3.3 Copular Clauses

English copula sentences come in several different flavours. In the taxonomy proposed by Higgins (1979), there are predicational, equative, identificational, and specificational, illustrated respectively in (11-a)-(11-d):

(11) a. Liv is clever.
b. Childish Gambino is Donald Glover.
c. That is a great tie!
d. The best Democratic candidate is Bernie Sanders.

There is a rich syntactic literature on this classification (Mikkelsen, 2005; den Dikken, 2006; Den Dikken, 2013; Heycock & Kroch, 1999; Heycock, 2012), and there is no consensus either on whether to uphold Higgins original taxonomy, to expand it, or to reduce it. Fortunately we need not concern ourselves too much with this debate, as all that we need to establish is the semantic relationship between the DP and CPs in the copular clauses that concern us.

Despite the debate about the structure of these copulars, there is fairly wide agreement that fit into only two basic semantic classes (Heller, 2005; Heycock, 2012). Based roughly on (Russell, 1919), these are *pedication* and *identity*. *Predicate* copula sentences combine a subject and a predicate and say simply that the predicate is true of the subject. The copula is essentially semantically 'inert'.

(12) $[\![\text{BE}_{pr}]\!] = \lambda P_{\langle e,t\rangle}.\lambda x_e.P(x)$

On the other hand, *identity* copulas take two arguments which are presupposed to be of the same semantic type and say that they are identical (Heycock & Kroch, 1999).

(13) $[\![\text{BE}_{eq}]\!] := \lambda\alpha : \underline{\alpha \in D_\tau}.\lambda\beta : \underline{\beta \in D_\tau}.\alpha = \beta$

How do these semantic classes relate to the Higgins taxonomy, and which of these two classes do our copulars with a pre-copular DP and post-copular CP fit into? We can eliminate identificationals from our consideration very quickly. These are characterised by a demonstrative in pre-copular position, something which is not

true of the sentences that interest us.

The status of specificationals is much less clear. One line of work looks to assimilate them to a type of inverted predication (Mikkelsen, 2005; den Dikken, 2006; Den Dikken, 2013), whilst another treats them as a special case of the identity class (Romero, 2005; Heycock, 2012). This may turn out to be important, as Hankamer and Mikkelsen (2021) proposes that copulars with post-copular CPs are in fact specificational. Making matters worse, there are no robust syntactic tests for distinguishing between specificational and equational copular clauses (Heycock, 2012).

As shall be demonstrated in the following section, copulars with CPs pattern with namely appositions, which are a much more clear-cut case of the identity relation. This means that either these constructions are not in fact specificational, contra Hankamer and Mikkelsen (2021), or that the relationship between the two elements in a specificational is in fact identity, supporting Romero (2005).

3.3.1 DP CP Copular clauses express Identity

One test used to distinguish between equative and specificational copulars on the one hand and predicational ones on the other is the possibility of small clauses in the complement of *consider*. The complement to *consider* can be a small clause, one element of which must be a predicate and the other the argument to that predicate (Heycock, 2012). If the two elements in the embedded clause can appear without an explicit connecting *to be*, then the relationship between them can be predication, if they can only appear with the overt nonfinite copula, then the relationship is identity.

(14) a. I consider Liv (to be) clever.
b. I consider Childish Gambino *(to be) Donald Glover.
c. I consider the best Democratic candidate *(to be) Bernie Sanders.

(Potts, 2002) points out that this test could be extended to constructions like (15), to show that they too are predicational and not equational.

(15) a. *I consider the rumour that she is hungry.
b. *I consider that she is hungry the rumour.

3.3.2 The Higgins-Stowell Facts

As noted above, many nouns which appear in NCC can also appear across a copula from a clause.

(16) a. the theory that evolution is true...
b. The theory is that evolution is true.
c. the rumour that Mary kissed Sally...
d. The rumour is that Mary kissed Sally.

Higgins (1979) and Stowell (1982) independently observed that the set of nouns which can directly embed a clause and the set of nouns which can appear in pre-copular position across from a postcopular clause are not coextensive. Nouns like *anger*, *probability* and *possibility* appear in NCC but not in clausal copulars.

(17) a. John's anger that he was not chosen ...
b. *John's anger was that he was not chosen.
c. The probability that John is tall (is low.)
d. *The probablity was that John is tall.
e. His insistence that we arrive early...
f. *His insistence was that we arrive early.

Conversely, nouns like *cause*, *event*[3], *mystery*, *folly*, *hurdle*, and *power* appear only in clausal copulars and not in NCC.

(18) a. *The cause that he suddenly disappeared...
b. The cause was that he suddenly disappeared.
c. *The event that he suddenly disappeared...
d. The event was that he suddenly disappeared.
e. *The mystery that he suddenly disappeared...
f. The mystery was that he suddenly disappeared.
g. *The folly that he suddenly disappeared...
h. The folly was that he suddenly disappeared.
i. *The hurdle that he suddenly disappeared...
j. The hurdle was that he suddenly disappeared.
k. *His power that he could disappear at will...
l. His power was that he could disappear at will.
m. *The magic that he suddenly disappeared...
n. The magic was that he suddenly disappeared.
o. *The cross you bear that you put too much pressure on yourself...
p. The cross you bear is that you put too much pressure on yourself.

[3]This string is possible in the construction 'in the event that...', but this use is so restricted it appears to be idiomatic (Huddleston & Pullum, 2002)[p960].

(i) In the event that we land on water please put on the lifejacket located under your seat.

The explicit *namely* appositions pattern with copulas in this respect. That is nouns like *cause* and *mystery* are possible in copulars and *namely* appositions, but not with NCC, and *anger* and *insistence* are possible with NCC but not in copulars or *namely* appositions.

(19) a. The cause, namely that he suddenly disappeared, ...
b. The mystery, namely that he suddenly disappeared, ...
c. John's anger, *namely that he was not chosen, ...
d. His insistence, *namely that we arrive early, ...

Definite Facts

Elliott (2017, 2020) points out that when the noun *fact* takes a NCC it can only be a singular definite.

(20) a. She discovered the fact that we won't be home in time.
b. *She discovered a/one fact that we won't be home in time.
c. *She discovered some/several facts that we won't be home in time.

This contrasts with *fact* without a NCC which can be either plural or indefinite, as well as definite.

(21) a. John discovered the most important fact (about Napoleon).
b. John discovered several facts (about Napoleon).
c. John only discovered one/a single fact (about Napoleon).

Note that this is also only true of a subclass of nouns, e.g. *fact/proposition/possibility*, but not in general, as it is possible for many nouns to be available as plurals or indefinites even with a NCC.

(22) Several rumours/theories/claims that Mary would be hired were going around.

The unavailability of indefinites and plurals with *fact* in DNCPs contrasts with the behaviour of *fact* in copulars or *namely* appositions, where plurals and indefinites are possible.

(23) a. One fact to bear in mind is that we won't be home in time for dinner.
b. He discovered an important fact, namely that John was over retirement age.

(24) a. Two important facts are that Napoleon was born in Corsica and that Corsica was not at that time part of the France.

b. He discovered two facts that day, namely that Napoleon was born in Corsica and that Corsica was not at that time part of France.

This suggests that the relationship between *the fact* and a CP in a DNCP (*the fact that P*) is not the same as the relationship between *the fact* and a CP in copulas or *namely* appositions.

Plurals

We can observe a similar phenomenon with plurals across these three constructions, where again we see copulas and appositions patterning the same way, and against DNCPs.

It is possible to have a copular with a plural or group DP and a post-copular coordination.

(25) a. Two members of the Beatles are John Lennon and George Harrison.
b. The Beatles are John Lennon, George Harrison, Paul McCartney, and Ringo Starr.

Here *John Lennon* and *George Harrison* cumulatively and exhaustively make up *two members of the Beatles*, or the four members cumulatively and exhaustively make up *the Beatles*. It is not possible to use this construction non-exhaustively. (26) cannot mean that John Lennon and George Harrison were some of the members of the Beatles, only, presumably speaking hyperbolically, that they exhaustively make up the Beatles, i.e. that there are no other members.

(26) #The Beatles are/were John Lennon and George Harrison.

This makes sense if these copulas are expressing the identity relation, and only the total members can form a plural which is identical to the group, rather than for example a subclass.

Turning again to NCC we see again that there is an assymetry between DPCPs and DPs across a copula from a CP. Whilst it is possible to have a plural DP with only one NCC, in a copular construction we must coordinate several CPs to exhaustively present a group which is identitical to the plural DP.

(27) a. Two distinct theories that humans and chimps are related have been proposed, Darwin's one and Chambers's one.
b. Two different rumours that Mary is going to be hired have been going around, one is just unfounded gossip, but the other came from someone on the hiring committee.

(28) a. Two distinct theories are that humans and chimps are related *(and that species were created fully formed).
b. The two rumours are that Mary is going to be hired *(and that Susan is going to be promoted).

This suggests that these copulars behave like those in (25) wherein we must list *all* (both) of the CPs which make up the plural *two rumours*.

And again we see that *namely* appositions pattern the same way as copulas and against DPCPs.

(29) a. Two distinct theories, namely that humans and chimps are related *(and that species were created fully formed), have been proposed.
b. Two rumours, namely that Mary is going to be hired *(and that Susan is going to be promoted), have been going around.

3.3.3 DP proforms

As anticipated by the analysis in which NCCs combine first with an NP before being embedded under the larger DP, we find that DP proforms like 'something' and 'it' cannot take NCC, even though each of them can appear in equative copulars and namely appositions.

(30) a. *He discovered something important that Mary would be elected.
b. He discovered something important, namely that Mary would be elected.
c. Something important to bear in mind is that Mary will soon be elected.

(31) a. *It that Mary would be elected is important.
b. Something important has happened and Mary can't wait to share it, namely that she's going to be elected.
c. Mary has something important to share. It is that she will be elected.
d. It may be that there isn't enough food.

This confirms what we saw earlier about the expected constituent structure of true appositions.

3.3.4 'Proof'

The noun 'proof' stands in a slightly unusual relationship to its cognate verb 'prove'. Most deverbal nouns denote what would be the object of their parent verb, e.g. A 'discovery' is something 'someone discovered', a 'belief' is something 'someone believed', an 'implication' is something that 'something implies'. 'Proof' on the other hand is a 'subject nominal' (Grimshaw, 1990; Moulton, 2009b), a class

which it shares with 'evidence'. A 'proof' is something which 'proves something', not something proved. 'Proofs prove' and 'Evidence evidences', but 'Discoveries don't discover' and 'Beliefs don't believe'. The NCC of 'proof' however, describes the object of a proving, not the proof itself, in contrast to a CP in apposition or across a copula.

Imagine a chain of three statements where each statement, perhaps alongside a demonstration, proves the next.

(32) Every number is uniquely expressible as the product of primes $\vdash$
There are infinitely many primes $\vdash$
There are infinitely many twin primes[4]

(33) a. Euler's proof that there are infinitely many primes...
b. Euler's proof, namely that there are infinitely many primes ...
c. Euler's proof was that there are infinitely many primes.

In (33-a), Euler must have cited some fact, say the fact that every number is uniquely expressible as the product of primes, in order to prove 'that there are infinitely many primes'. The CP describes what was proved, not what did the proving. In contrast in (33-b) and (33-c) 'that there are infinitely many primes' must have been used, perhaps as a lemma, in order to prove some other theorem.

We can also see this when 'proof' appears in a DNCP and DPbCP, or DNCP and namely apposition in the same sentence.

(34) a. Euler's proof that there are infinitely many primes was that every number is uniquely expressible as the product of primes (alongside a demonstration).
b. Euler's proof that there are infinitely many primes, namely that every number is uniquely expressible as the product of primes, ... was discovered centuries after the theory was first proposed.

Note, incidentally, the contrast between this and the oddness/redundancy of most other nouns when we try the same thing.

(35) a.???The fact that the Earth is round is that the Earth is round.
b.???The fact that the Earth is round, namely that the Earth is round...
c.???The possibility that the Earth is round is that the Earth is round.
d.???The possibility that the Earth is round, namely that the Earth is round ...
e.???The rumour that Mary got the job is the rumour that Mary got

[4]This is still unproven at time of writing, but we can dream.

f.???The rumour that Mary got the job, namely that Mary got the job.

3.3.5 Symmetry

Asher (1993) dismisses the appositional analysis on the basis that appositions are symmetrical, whereas DPCPs clearly are not. That is we expect the order of genuine appositions to be interchangeable, but we do not observe this in DPCPs.

(36) a. John, a friend, took me home last night.
b. A friend, John, took me home last night.
c. The thought that Fred is insane has crossed my mind.
d???That Fred is insane, the thought, has crossed my mind.

(Asher, 1993)[p172]

3.3.6 Summing Up

The evidence presented shows that there is a fundamental disanalogy between equative and appositional structures on the one hand and NCCs on the other. I showed how we can begin to capture the places where these disanalogies arise on an predicative view of CPs in NCCs. In the rest of this chapter we will explore some of the details of this proposal and show how the semantics can be extended to CPs embedded under verbs, making use of compositional mechanisms that have independent justification in the compositional system away from clause embedding.

However, we should note that the examples above demonstrate that, even if they are not in apposition as NCC, CPs CAN be in an equative or appositional relationship to a DP, and this fact will need explaining. I reserve tackling this problem until the following chapter when we have built up a better view of the semantics here.

Before moving on to the predicative analysis of NCC, we should dedicate some time to ruling out another proposed analysis under which the disanalogies observed can also be derived, the 'Relative Clause' analysis.

3.4 The Relative Clause Analysis

Kayne (2010), Arsenijevic (2009), and Haegeman (2012) propose to analyse NCCs as relative clauses. A common piece of evidence adduced in support of this claim is that the complementiser used to introduce NCCs is identical to the relativiser that introduces a relative clause.

(37) a. The rumour **that** Fatima is a thief ...

b. The ball **that** Harry kicked ...

Arsenijevic (2009) and Haegeman (2012) observe that this is not exclusively true of English, but also cross-linguistically of several other languages. Dutch *dat*, Serbo-croatian *sto*, Korean *un*, Spanish *que* and Burmese *té* are all used both to introduce NCCs and relative clauses.

The clearest initial challenge to this analysis is that relative clauses, unlike NCCs, involve an obvious gap. This gap corresponds to the element which has been abstracted away in order to form the predicate denoted by the relative clause

(38) The ball that Harry kicked ___ ...

(38) denotes the x such that x is a ball and 'Harry kicked x' is true. The gap is necessary to derive the predicate from the proposition that would be denoted by a corresponding gapless sentence. This can be semantically modelled straightforwardly as lambda abstraction (Heim & Kratzer, 1998; Haegeman, 2012).

(39) $[\![\textit{Harry kicks the ball}]\!] = Kick(h, b)$

(40) $[\![\textit{that Harry kicks\_\_\_}]\!] = \lambda x.Kick(h, x)$

This predicate can then combine with the noun *ball* through restriction, forming the complex predicate which can then be the argument of the definite article *the*, assumed here to denote the iota operator.

(41) $[\![\textit{ball that Harry kicks}]\!] = \lambda x.ball(x) \wedge Kick(h, x)$

(42) $[\![\textit{the ball that Harry kicks}]\!] = \iota x(ball(x) \wedge Kick(h, x))$

In contrast, NCCs do not contain an obvious gap which would correspond to a lambda abstracted position.

(43) The fact that Harry kicked the ball...

Kayne (2010) and Arsenijevic (2009) each propose a different account for where the non-obvious gap in NCCs must be. I will briefly summarise Kayne and Arsenijevic's positions here, omitting Haegeman as she provides evidence for this type of structure but not a concrete anaylsis. I do not intend to argue fully against each account individually, but I will raise some initial problems for each account.

Kayne

For Kayne the gap is in the complement to a deleted prepositon, *in*.

(44) The fact that Harry kicked the ball ~~in~~ ___

He contends that this derives from full sentence structures like (45)

(45) Harry kicked the ball in fact.

However, this does not extend well to other nouns, where no such PPs are possible, with *in* or any other preposition.

(46) *Fatima is a thief in/on/as/of/from/about rumour.

For this reason, however well Kayne's approach does specifically for the noun 'fact' in English, it could not help for any of the hundreds of other CP embedding nouns that we might be interested in. We therefore won't pursue this approach any further.

Arsenijevic

Arsenijevic (2009)'s account has the gap corresponding to a force projection of the embedded sentence.

(47) The rumour$_{\text{FORCE = ASSERT}}$ that ____$_{\text{FORCE}}$ Fatima is a thief.

This FORCE projection can be valued as an assertion, a question, or an imperative, and is saturated by a corresponding feature on the noun. This account extends naturally to nouns for which the FORCE value seems intuitive such as *assertion/claim/proposal* and *order/command/demand*, but it is not as obvious how to value less linguistic-denoting nouns for assertive force, for example *fact/observation/possibility/anger*. It is also surprising that nouns which should intuitively be valued with [QUESTION] are not possible in Arsenijevic's proposed relative clause structures.

(48) a. *The question$_{\text{FORCE = QUESTION}}$ that ____$_{\text{FORCE}}$ Fatima is a thief.
b. *The inquiry$_{\text{FORCE = QUESTION}}$ that ____$_{\text{FORCE}}$ Fatima is a thief.

This approach offers a significant improvement on Kayne's in that it does not rely on the idiosyncratic behaviour of 'fact' with 'in'. However, we will now turn to some of the problems for relative clause analayses.

Crosslinguistic evidence against the Relative clause analysis

De Cuba (2017) provides compelling evidence which undercuts the crosslinguistic evidence provided in support of the relative clause analysis of NCCs. Whilst Present Day English, Dutch, Serbo-croatian, Korean, Spanish, and Burmese use an item which is apparently the same to introduce relative clauses and NCCs, many other

languages use distinct items. Furthermore, all of these languages, including the aforementioned adduced in favour of the relative clause analysis, use the same item to introduce NCCs and VCCs, whether or not this is the same as the relativiser[5].

(49) a. Basque
   (i) RC: *-n*
   (ii) NCC: *-la*
   (iii) VCC: *-la*
   b. Bulgarian
   (i) RC: *deto*
   (ii) NCC: *ce*
   (iii) VCC: *ce*
   c. Zulu
   (i) RC: *e-*
   (ii) NCC: *ukuthi*
   (iii) VCC: *okuthi*
   d. Finnish
   (i) RC: *joka*
   (ii) NCC: *etta*
   (iii) VCC: *etta*
   e. Hindi
   (i) RC: *jo*
   (ii) NCC: *ki*
   (iii) VCC: *ki*
   f. Icelandic
   (i) RC: *sem*
   (ii) NCC: *a*
   (iii) VCC: *a*
   g. Swedish
   (i) RC: *som*
   (ii) NCC: *att*
   (iii) VCC: *att*

To add to this, Old English patterns with this latter class of languages in having a distinct item for relative clauses on the one hand and NCCs and VCCs on the other[6].

(50) a. Old English

[5] All data here taken from (De Cuba, 2017)

[6] Thanks to Rob Truswell and Bettelou Los for pointing this out to me

(i) RC: *the*
(ii) NCC: *thæt*
(iii) VCC: *thæt*

Of course this data does not entirely rule out the possibility that English may differ from these languages in having only RCs and no true NCCs, PDE might use a different NCC structure than Old English. It does, however, undermine the central motivation for this analysis as presented in Arsenijevic (2009) and Kayne (2010), namely the crosslinguistic commonalities between relativisers and complementisers in NCCs.

This leaves us in a position to expect by default that we will need to analyse NCCs and VCCs together, and as distinct from relative clauses. However, we should note that the predicative analysis argued for in this thesis shares in common with the relative clause analysis that CPs are semantically predicates which combine with a noun through restriction. Our analysis differs in not deriving this predicative meaning through lambda abstraction on a gap as with relatives. It therefore does not have to deal with the problem of finding a non-obvious relative clause gap.

3.5 A brief introduction to Restriction and Saturation

Chung (2001) describe a system of compositional semantic mechanisms, primarily aimed at capturing how nominal arguments relate to verbs, but meant to capture the 'calculus' of semantic saturation more generally. Chung and Ladusaw's focus is on the crosslinguistic variations of noun-incorportation and nominal arguments, but their system extends very easily to the semantic composition of predicative CPs.

The first operation they define is the familiar *function application* (FA), which "takes two arguments, the first of which is a function of domain type σ and an expression of semantic type σ. The value of the operation is an object of type τ, the range type of the function" (Chung, 2001)[p3]. This is illustrated here with a toy fragment.

(51) a. John fed Fido.
b. $[\![\text{John}]\!] = \text{j}$
c. $[\![\text{Fido}]\!] = \text{f}$
d. $[\![\text{fed}]\!] = \lambda x_e.\lambda y_e fed(y, x)$
e. $\mathbf{FA}(\lambda x_e.\lambda y_e fed(y, x),\ f) = \lambda y_e fed(y, f)$
f. $\mathbf{FA}(\mathbf{FA}(\lambda x_e.\lambda y_e fed(y, x),\ f),\text{j}) = fed(j, f)$

Functional application is in many ways the primary mode of saturation, but C & L describe another possible pathway through which an unsaturated predicate can become saturated, through restriction and existential closure.

First we implement the operation of *Existential Closure* (EC), which takes an unsaturated function and 'removes the incompleteness' by existentially quantifying over one of the arguments. This is typically invoked at the top of the composition to close off a davidsonian event argument, but it has also been utilised in various other constructions to bind an individual argument which is not saturated through FA, e.g. in passives or middles (Chomsky, 1993; Marelj, 2004).

(52) a. Fido was fed.
b. $[\![\text{fed}]\!] = \lambda x_e.\lambda y_e.\lambda e_v.fed(e, y, x)$
c. $\mathbf{EC}(\mathbf{EC}(\mathbf{FA}(\lambda x_e.\lambda y_e.\lambda e_v.fed(e, y, x)\ ,\ \text{f}\ ))) = \exists e.\exists y.fed(e, y, f)$

One further operation is needed. In Heim and Kratzer's system predicate modification is introduced to handle in particular cases where predicates combined with other predicates, such as adjectives with nouns. C & L implement a more generalised version of this called 'Restrict' (RE), which "composes a predicate directly with a property to yield a predicate without changing the degree of unsaturation. Assuming that the predicate is interpreted as a function f, the result of restricting the predicate with property p is the original function with its domain restricted to the subdomain of its original domain to elements that have the property p"(Chung, 2001)[p7].

(53) a. red dog
b. $[\![red]\!] = \lambda x_e.red(x)$
c. $[\![dog]\!] = \lambda x_e.dog(x)$
d. $\text{RE}(\lambda x_e.red(x),\ \lambda x_e.dog(x)) = \lambda x_e.red(x) \wedge dog(x)$

To demonstrate how this can play into the wider compositional system, imagine a possible composition of a noun and verb (not legal in English) where the noun does not first combine with a D, but instead combines with the verb through restrict, with that argument place becoming saturated by EC.

(54) a. John fed dog.
b. $\text{EC}(\text{FA}(\text{EC}(\text{RE}(\lambda x_e.\lambda y_e.\lambda e_v.fed(e, y, x),\ \lambda x_e.dog(x))),\ \text{j}\ )) = \exists e.\exists x.fed(e, j, x)$

This direct semantic composition of a noun with a verb is not systematically possible in English, but it is possible in languages which make systematic use of noun-incorporation.

In the following sections we will see how English predicative CPs can combine

with internal argument positions of a verb without saturating them by FA in much the same way.

3.6 Predicativism

A recent view finding inspiration in (Kratzer, 2006) and developed in (Moulton, 2009b, 2015, 2017; Bogal-Allbritten, 2016; Bondarenko, 2020, 2021b) and (Elliott, 2017) treats that-clauses as semantically denoting a predicate of contentful entities. This view aims to solve a number problems for traditional analyses of that-clauses which take them to denote propositions (either as individuals or sets of possible worlds).

Moulton and Elliot disagree on several consequentdetails about the implementation of this proposal, notably on TC composition with verbs, but both proposals provide the same treatment for TC composition with content nouns as in (55).

(55) The rumour that Mary kissed John.

3.6.1 $\mathfrak{F}_{\text{cont}}$

If full TP clauses denote a proposition as we have assumed, then what is the semantic mechanism that allows CPs to come to denote predicates. Following (Kratzer, 2006), and in the same spirit as (Stalnaker, 1976, 1984), we can define a partial function $\mathfrak{F}_{\text{cont}}$ which maps contentful individuals to their propositional content.

(56) $[\![\text{that P}]\!] = \lambda x_c.\mathfrak{F}_{\text{cont}}(x) = \text{P}$

$\mathfrak{F}_{\text{cont}}$ is partial as it is only defined for a subdomain of individuals, represented here as c. This reflects the fact that only certain nouns are compatible with NCC.

It's hard to see exactly what the generalisation is for which nouns $\mathfrak{F}_{\text{cont}}$ is defined. We might say simply something like nouns which predicate of individuals which cannot be understood as contentful, either linguistically, cognitively, normatively or modally cannot combine with NCCs.

(57) a. *The tree that the Earth is old...
b. *The fashion that big hats are cool...

And yet media artifact nouns are a clear class of exceptions here. 'books/newspapers/articles' are all easily associated with linguistic propositional content, and yet none are compatible with a NCC.

(58) *The book/article that the economy is tanking.

These types of example are discussed in, amongst others, Elliott (2017) and Djarv (2021), and I will not dwell on them here, except to note that they are something of a puzzle for the intuitive characterisation of $\mathfrak{F}_{\text{cont}}$

It is a function, rather than a more generic relation, because $\mathfrak{F}_{\text{cont}}$ must return the unique content of a contentful entity. As Elliott (2020) observes, NCCs cannot be stacked on a single noun, in contrast to other predicative modifiers like adjectives, which can be stacked indefinitely as long as doing so does not result in a contradiction.

(59) *The rumour that Mary kissed John that Sarah hates Alex...

(60) The big red wide lead ... unfortunate balloon ....

Is $\mathfrak{F}_{\text{cont}}$ hosted in the complementiser 'that' or somewhere in a functional projection above it? (Elliott, 2017) argues that since NCC can be coordinated with their complementiser in tact, before composing with a noun, the $\mathfrak{F}_{\text{cont}}$ must be introduced higher than C.

(61) Joe made the argument that Donald has a bad foreign policy and that the Democratic government is fiscally responsible.

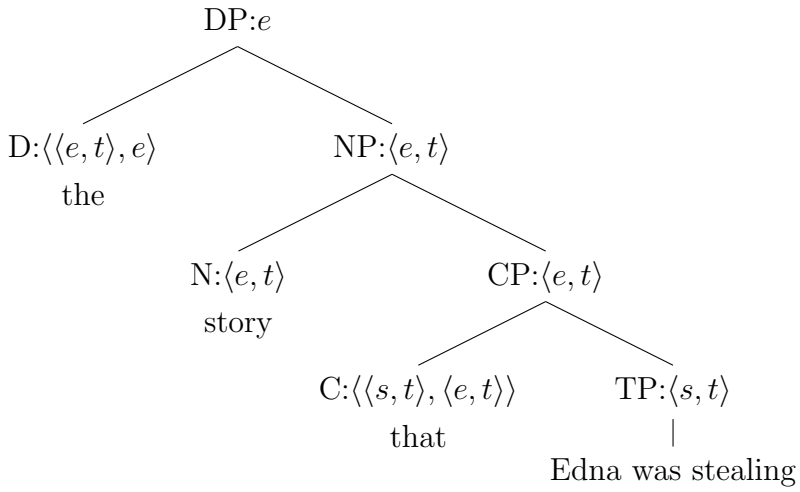
Bassi and Bondarenko (2020) use evidence from contrasts between CP and TP coordination to argue against Elliot's proposal and in favour of the Moulton/Kratzer proposal wherein the $\mathfrak{F}_{\text{cont}}$ is introduced by the complementiser. For simplicity of exposition here we will treat it as being the semantic contribution of the complementiser as it has no functional difference for the problems we consider here, but adopting the modified proposal would not complicate the semantics.

3.6.2 Composition with Nouns

It's straightforward to see how a predicative CP could combine by Restriction with a noun like 'story', where there is some object in the intersection of each of their domains, i.e. there is something which is both a story and has P as content.

(62) a. $[\![\textit{story}]\!] = \lambda x.\text{story}(x)$
b. $[\![\textit{thatEdnawasstealing}]\!] = \lambda x.\mathfrak{F}_{\text{cont}}(x) = \textit{Edna was stealing}$
c. $\text{RE}(\lambda x.\text{story}(x),\ \lambda x.\mathfrak{F}_{\text{cont}}(x) = \textit{Edna was stealing}) = \lambda x.(\textit{story}(x) \wedge \mathfrak{F}_{\text{cont}}(x) = \textit{Edna was stealing})$

With a full DNCP:



$[\![\textit{the}]\!] = \lambda F_{\langle e,t\rangle}.\iota x(F(x))$

$[\![\textit{story}]\!] = \lambda x.\text{story}(x)$

$[\![\textit{that}]\!] = \lambda P_{\langle s,t\rangle}.\lambda y_e.\mathfrak{F}_{\text{cont}}(y) = P$

$[\![[\textbf{CP}]]\!] = \lambda x.\mathfrak{F}_{\text{cont}}(x) = \textit{Edna was stealing}$

$[\![[\textbf{NP}]]\!] = \lambda x.(\textit{story}(x) \wedge \mathfrak{F}_{\text{cont}}(x) = \textit{Edna was stealing})$

$[\![[\textbf{DP}]]\!] = \iota x.(\textit{story}(x) \wedge \mathfrak{F}_{\text{cont}}(x) = \textit{Edna was stealing})$

This compositional mechanism is, semantically at least, identical to how adjectival modifiers combine with nouns as described in 'the red balloon', above.

Content Nouns

Though a full resolution is beyond the means of this thesis, we should have some discussion and suggestion about which nouns are compatible with NCC. Content nouns are frequently derived from verbs, but they can also be derived from adjectives, or simply be non-derived nouns.

(63) a. **Derived from Verbs**
announcement, answer, assertion, assumption, claim, comment, complaint, conclusion, dream, expectation, guess, hope, inference, indication, judgment, knowledge, objection, order, prediction, presumption, pretence, promise, prophesy, proposal, reasoning, recommendation, report, ruling, sense, speculation, statement, stipulation, supposition, surprise, suspicion, thought, understanding, worry.

b. **Derived from Adjectives**
anger, happiness, necessity, possibility, probability, sadness.

c. **Non-derived**
consensus, lore, problem, concept, theory, idea, fact, pattern, doctrine, myth, notion, story, context.

For nouns derived from verbs the noun which takes a NCC is frequently a simple event nominal, which is derived from the internal argument of the verb (Grimshaw, 1990; Moulton, 2009a). However beyond this putative derivation in the deverbal cases, it is non-obvious from a grammatical point of view make this list and not others.

For example whilst the adjective-derived nouns in (63) all have a cognate adjective which allows a CP complement this does mean that all such adjectives have a cognate noun that takes NCC.

(64) a. He was angry/sad/happy that she was walking
b. His anger/sadness/happiness that she was walking ...

(65) a. He was upset that she was walking.
b. *His upset/upsettness that she was walking ....

To add to this, non-derived nouns are unlikely to have any grammatical account for why they and not all nouns take NCCs that does not appeal heavily or exclusively to their lexical semantics. For this reason to give a little grounding to the notion of propositional content as it is needed for the purposes of this proposal, we'll briefly look through some accounts in the Philosophical literature which address this topic.

What does it mean to 'have a proposition as content'? It is tempting to analyse the proposition in the content clause as providing the truth conditions for the nominal. We might think that the content of a DP describes the proposition that it 'represents'. This has some intuitive plausibilty, as Stalaker writes:

> 'Some things in the world - for example, pictures, names, maps, utterances, certain mental states -*represent*, or *stand for*, or are *about* other things - for example, people, towns, states of affairs.' (Stalnaker, 1984)

But this can't be the whole story. As has been observed times in the philsophical literature, not all DPCPs can be predicated with "is true" (Moltmann, 2013).

(66) a. The theory that the Earth is round is true.
b. ???The order that you go to the store is true.
c. ???The dream that the Earth is round is true.
d. ???The law that the Earth is/be round is true.

It seems that many DPCPs, despite being strongly related to a proposition, are unlike propositions in that truth is not what they are primarily concerned with. It would be hard to understand 'the law/rule that you shouldn't wear shoes indoors' as being either true or false. Laws, rules, and orders do not have truth conditions, they have conditions under which they are satisfied.

Content nouns are not exclusively 'representational' of a state of affairs, they often express normative, epistemic, or bouletic relations to them. Rather than think of the content of an individual as expressing its 'truth' conditions, proposals have been made in the Philosophical literature to treat these as satisfaction (Moltmann, 2003) or 'correctness' (Forbes, 2018; D'Ambrosio, 2021) conditions. The proposition which acts as the content of a law, rule, or order might be the set of worlds in which that law is followed or abided. The content of a hope or wish might be the set of worlds that the holder would prefer or desire the actual world to be in. The content of an announcement might be something closer to a familiar notion of communicative content.

We will not pursue a full typology of content nouns in terms of these categories, that would be a whole thesis in itself. There do seem to be some obvious intuitive categories which content nouns fit into. Some intuitive classifications have been suggested previously (Anand et al., 2017; Moltmann, 2013; Nebel, 2019). For convenience I list some common classes here:

(67) Normative: *order, promise, law, rule.*

(68) Preferential: *desire, hope, wish, recommendation*

(69) Emotive: *anger, sadness, fear*

(70) Representational: *theory, belief, fact*

(71) Inferential: *conclusion, inference, reasoning*

(72) Communicative: *announcement, claim, statement*

These categories are highly unlikely to be exhaustive and its uncertain what if any reflections they have in grammar. One interesting correlation is that Normative and Preferentials are much more likley to take subjunctive NCC. However we can see that this is not a universal requirement, as they are also happy with declarative NCCs with a 'harmonic' modal like 'should'.

(73) a. The general gave the order that the building be/???is taken.
b. The general gave the order that the building should be taken.
c. The desire that he be/??is home on time...
d. The desire that he should be home on time...

I leave a fuller attempt at analysing the various classes of content nouns for another time. The key takeaway moving forward is simply that NCCs do not always give the truth conditions of the content noun they combine with. This should also count against an appositional analysis, since it is hard to construe orders or desires as being coreferential with a proposition if they do not even have the same truth conditions.

This becomes particularly clear when we look at individuals like 'rumours' which clearly have different properties from propositions. Rumours come into and out of existence and can be spread from person to person. Multiple rumours can have the same content ('two rumours that Mary will be hired') without being the same proposition.

3.6.3 Comparison with with another approach

A different approach which achieves similar results is to have nouns which take NCC to have an in built argument slot for a proposition that characterises content, rather than utilising a mechanism like $\mathfrak{F}_{\text{cont}}(x)$ in the wider grammatical system:

"Abstract nouns like fact, truth, etc., must have an optionally characterization argument place, since they may take that clauses or other nominals that characterize abstract entities like facts or propositions" (Asher, 1993)p175

Djarv (2021) also adopts a similar approach, where content DPs have an argument place for a proposition, which will be interpreted as a description of its content.

These approaches agree with the approach pursued here on much of the philosophical grounding and the rejection of apposition or relative clause style analyses of DPCPs. This would make these nouns exceptional, as nouns do not typically take arguments in general (Grimshaw, 1990).

It would be technically possible to build an account which mirrors the one pursued in this thesis wherein *think* type verbs with CP complements describe relations to the content of an object rather than to the DP object itself. This would resolve our starting puzzles in much the same way, though would be less parsimonious in having to propose an idiosyncratic mechanism for these verbs rather than hijacking an existing compositional system for nominals.

For these reasons I will set aside this analysis for the purposes of this thesis, though we should bear in mind that if compelling evidence pushed us towards this approach, then a version of the system described in the next two chapters of this thesis, relying on Maximise Presupposition to derive the distinction between our verb classes, would also be possible.

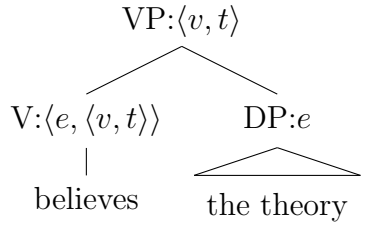
3.7 Clausal Composition with Verbs

We saw in Chapter 2 that CEVs must take individuals as their arguments.

(74) $[\![believe]\!] = \lambda x_e.\lambda e_v.believe(x)(e).$

This makes their composition with DPs straightforward, the individual denoted by the DP simply saturates the internal argument position of the verb.

(75)



$[\![believes]\!] = \lambda x_e.\lambda e_v.believe(x)(e)$

$[\![[\mathbf{DP}]]\!] = \iota x.(theory(x))$

$[\![[\mathbf{VP}]]\!] = \lambda e_v.believe(\iota x.(theory(x)))(e)$

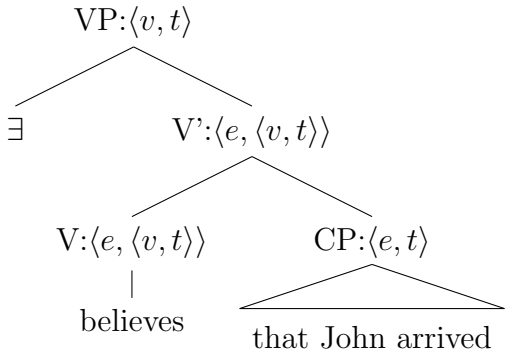
With an external v introducing the agentive argument.

How then can they combine with predicative clauses? The solution proposed in (Kratzer, 2006) is that they combine via restricting the internal argument position of the verb, and then being existentially closed higher up in the derivation. Cached out in the formalism of (Chung, 2001) we would see a composition like the following:

(76) $\text{EC}(\text{RE}(\lambda x_e.\lambda e_v.believe(x)(e),\lambda x_e.\mathfrak{F}_{\text{cont}}(x) = \textit{John arrived})) = \lambda e_v.\exists x(believe(x)(e) \wedge \mathfrak{F}_{\text{cont}}(x) = \textit{John arrived})$

And represented more conventionally with a tree diagram:

(77)



$[\![believes]\!] = \lambda x_e.\lambda e_v.believe(x)(e)$

$[\![[\mathbf{CP}]]\!] = \lambda x_e.\mathfrak{F}_{\text{cont}}(x) = \textit{John arrived}$

$$[\![\textbf{[V']}]\!] = \lambda x_e.\lambda e_v.believe(x)(e) \wedge \mathfrak{F}_{\text{cont}}(x) = \textit{John arrived}$$

$$[\![\textbf{[VP]}]\!] = \lambda e_v.\exists x(believe(x)(e) \wedge \mathfrak{F}_{\text{cont}}(x) = \textit{John arrived})$$

The CP combines via RESTRICT with the V to produce V' wherein the internal argument of the verb (it's direct object), now has the additional constraint that its content be that John arrived. This then combines with an existential closure to close off the internal argument such that the VP becomes fully saturated as if it had been fed a full internal argument in what we might think is the more conventional route. The result is a standard VP denotation as a predicate of events, where the event variable will be closed off by existential closure at some higher point in the derivation as is standard.

Note that given the theoretical assumptions we have made a predicate modification analysis in the style of Elliott (2017), would not be available. Predicate modification requires both combinators to be predicates, whereas what we have in V and CP are two functions for whom the first argument is of the same type, but only one of which is a predicate. This is precisely the circumstance for which the combinatorial mechanism of RESTRICT is designed to work, though originally explored in the nominal domain.

Note that the assumption which requires this is that the internal arguments of verbs are genuinely internal to the verb and not added on by a separate thematic head in a neo-davidsonian way. I will not argue directly against neo-davidsonianism, and it would in fact be technically possible to implement this account using a neo-davidsonian system, but it is convenient for the current analysis that a predicate modification based analysis a la Elliott (2017) is already blocked under these assumptions, since, as I will show in the next section, there are compelling reasons to think it would deliver the wrong semantic results anyway[7].

3.7.1 Predicates of Events

Elliott (2016, 2017) implements a variant of the predicativist proposal which agrees with the Moulton/Kratzer proposal in how TCs compose with nouns, but disagrees on how they compose with verbs. Elliot takes a neo-davidsonian approach, in which even 'internal' arguments are severed from the verb and suggests that CPs composes with verbs not by restricting an internal, thematic argument, but by modifying the event variable directly.

This ofcourse relies on the assumption that events are in the domain of individuals and the $\mathfrak{F}_{\text{cont}}$ function is defined for at least some of them. This assumption

[7]If we did assume a neo-davidsonian system we would need to find some other way to block the derivations proposed by Elliott, perhaps by being forced into restricting $\mathfrak{F}_{\text{cont}}$ to only being defined for non-event individuals.

is in itself not too problematic. There are good reasons to believe that the structure of the domain of events parallels the structure of the domain of individuals (E. Bach, 1986; Asher, 1993; Champollion, 2017). It is also the case that complex event nominalisations and -ing nominalisations, which are usually taken to denote events (Grimshaw, 1990; Sennrich, 2020), can be the complement to, for example, verbs of perception, which also take individual denoting DP complements.

(78) a. The dog saw John mowing the grass.
b. The dog saw the destruction of his home.
c. The dog saw the tree.

Moulton (2009a) argues for predicates of events for the Wager-Class. (Bondarenko, 2021b) argues for this to explain non-thematic readings of clauses in certain Russian verbs of saying. Rawlins argues for this with about PPs.

Whilst there may be good reasons to think that CPs can sometimes describe the content of an event, there are also good reasons to believe that this is not what is going on with CPs embedded under CEVs. Deverbal nominalisations from CEVs always denote a simple event nominal, which denotes the internal argument of the verb, not a complex event nominal, denoting the event argument, which is what would be expected under Elliott's analysis (Grimshaw, 1990; Moulton, 2014, 2015). 'Observation' can be either a simple or complex event nominal. When it has a NCC it cannot take arguments through PPs and does not preserve the aktionsart of the verb from which it is derived.

(79) The doctor's observation of the patients for 5 hours [CEN]

(80) The observation made by the doctor (*for 5 hours) [SEN]

(81) The doctor's observation [that he was sick] (*for 5 hours) [SEN]

(82) The observation that he was sick (*of John). [SEN]

This strongly suggests that CPs are predicates of individuals and not events, since the CEN which should be a predicate of an event is not even possible with a NCC. Despite its many similarities to the approach pursued in this thesis, simple predicate modification gets us the wrong result for these verbs and their objects. Relying instead on the more general mechanism of RESTRICT, of which predicate modification is a specific instance, allows us to avoid this. We block the type of derivation given by Elliott, since $\mathfrak{F}_{\text{cont}}$ is defined for individuals not events and so will not combine directly through predicate modification with the verb (also a presumed predicate of events), and instead must build up through combining with the internal argument of the verb. This approach also straightforwardly predicts the acceptability of quantifiers and cognate objects with CEVs, which Elliott must treat as at best 'special

cases'(Elliott, 2020).

3.7.2 Existential Closure of Individuals

We have implemented EC as a separate morphosyntactic head targeting the next argument to be composed. The original Predicativist proposal (Kratzer, 2006) remained agnostic on this. In C & L's original proposal Restrict was capable of changing the order in which the arguments must be saturated in the composition. There's no empirical reason to choose between these implementations here, though I am open to facts in other domains favouring one side or the other.

The introduction of existential closure as a strategy may seem like an ad hoc way of ensuring that the composition completes with a saturated meaning. It is however standardly assumed to occur at the top of the composition to close off the event argument introduced by the verb (Davidson, 1967; Heim & Kratzer, 1998).

It is utilised in various other constructions to bind an individual argument that has not otherwise been saturated middles and passives. (Chomsky, 1993) argues that the existential closure is introduced by passive morphology.

We can remain agnostic about whether the existential closure is introduced by a morphosyntactic head, or is an operation on an active lexicon (Reinhart, 2016).

3.8 Solving the Puzzles

Let us see how this approach addresses the puzzles laid out in chapter 2.

Something to note before directly addressing the empirical evidence is that this approach vindicates the intuitions and philosophical points of Forbes (2018) and D'Ambrosio (2021) whos see that-clauses describing the content of the object of a CEV, rather than being the object of a CEV directly.

3.8.1 Inferences with Quantifiers

Our picture generates the following analyses for the relevant cases of inferences with quantifiers:

(83) a. George believes that his hand is real.
b. $\exists e \exists x (AGENT(e)(g) \wedge believe(x)(e) \wedge \mathfrak{F}_{\text{cont}}(x) = \textit{his hand is real})$

(84) a. George believes something.
b. $\exists e \exists x (AGENT(e)(g) \wedge believe(x)(e))$

Here (81-b) is weaker than (83-b),it is simply missing a conjunct inside one of the individual existential, and is therefore entailed by it. The correct inference is therefore

derived straighforwardly.

3.8.2 Selectional Restrictions and Variability of Attitudinal Objects

Under our picture CEVs select for individuals not propositions. This allows them to impose fine-grained semantic selectional restrictions on these individuals, though not on their propositional content. The fact that these CEVs impose selectional restrictions on their objects despite all sharing the same CP complements is no more surprising than for any other verb which does not embed CPs. It is unsurprising that you can 'kick a ball' and not 'kick capital punishment', just as you can (but should not) 'propose capital punishment' but not 'propose a ball[8]'. Likewise it is unsurprising that you can 'think a thought' and not 'think a hope', and 'hope a hope' but not 'think a hope'. There is nothing peculiar about the fact that cognate objects are universally acceptable as objects since this is precisely how deverbal cognate objects are generally generated, as predicates of the direct object of a verb.

Again this vindicates the intuition in (Moffett, 2002, 2003, 2005) that substitution is just a matter of 'finding the right noun'. CEVs are in general possible with DPs as long as they are compatible with the selectional restrictions they impose. In this they behave exactly like we would expect any verb to.

3.8.3 Entailment Patterns

Our picture generates the following analyses for the entailment patterns with *believe* type verbs:

(85) a. Russell believes the theory that Arithmetic reduces to logic.
b. $\exists e \exists x(AGENT(e)(r) \wedge believe(\iota x.theory(x) \wedge \mathfrak{F}_{\text{cont}}(x) = \textit{Arithmetic reduces to Logic})(e))$

(86) a. Russell believes that Arithmetic reduces to logic.
b. $\exists e \exists x(AGENT(e)(r) \wedge believe(x)(e) \wedge \mathfrak{F}_{\text{cont}}(x) = \textit{Arithmetic reduces to Logic})$

Here again our theory correctly predicts the entailment from (85) to (86). If Russell believes the theory which has as content that Arithmetic reduces to Logic, then there is something which he believes and has as content that Arithmetic reduces to Logic. That is (86) is weaker than, and thus entailed by, (85).

The obvious problem here though is, like with many other views we rejected in chapter 2, we overgenerate and predict the entailment for ALL verbs, including the *discover* types for which the entailment does not in fact go through. In the next few sections I will raise this and other issues to be explored in the subsequent chapter.

[8]Aside from the 'party' reading of 'ball'.

3.9 Empirical Challenges for the view

Whilst the picture so far has been successful in capturing many of the empirical data, there are still two particular cases in which we can see the Predicativist picture either making the wrong prediction, or failing to provide an explanation. The first will be the central motivation for building an additiona account for *know* type verbs, whilst the second we will simply note and leave to the side, since more syntactic understanding of the behaviour copular clauses and small clauses in these environments would be needed and does not yet to my knowledge exist.

3.9.1 Entailment Failures with Know-type verbs

As noted, the theory of CP composition with CEVs via restrict incorrectly derives the entailments for the discover-class as well.

(87) a. Russell discovered the theory that Arithmetic reduces to logic.
b. $\exists e \exists x(AGENT(e)(r) \wedge discover(\iota x.theory(x) \wedge \mathfrak{F}_{\text{cont}}(x) = \textit{Arithmetic reduces to Logic}$

(88) a. Russell discovered that Arithmetic reduces to logic.
b. $\exists e \exists x(AGENT(e)(r) \wedge discover(x)(e) \wedge \mathfrak{F}_{\text{cont}}(x) = \textit{Arithmetic reduces to Logic})$

If this were the correct analysis then we should expect to see an entailment from (87) to (88) just like in the case of *believe*, but this is not bourne out.

3.9.2 Copular Clauses

There are some leftover questions about the construction of copular clauses which do not have neat or straightforward answers given the anaylsis we have given. Whilst none of these disprove our account, they are worth raising for answers in future work.

If CPs denote predicates why can't they appear in small clause complements to 'consider' or as predicative complements to a copula? It's not clear exactly what determines whether something can appear in a small clause or as a predicative post-copular (Heycock, 2012). Being semantically a predicate is a necessary, but not sufficient condition. APs, DPs, and PPs are possible, but not NPs, VPs, vPs, or apparently CPs.

(89) a. John is happy.
b. John is a man.
c. John is on the table.

(90) a. *John is man.
b. *John is walks the dog.

c. John is to be an honest man.[9]

d. The proof is that there are infinite primes.

If CPs are predicates then how can they appear across from a presumably individual denoting DP in a copular clause, given that equative clauses generally require both sides to be of the same type (Heycock, 2012)?

The Higgins Stowell facts still have no full account. In section 3.6 I suggested some directions that might be pursued for an understanding of which nouns allow NCCs and which can appear across a copula from a CP, but we are still a long way away from having any account which generates the right classes of nouns.

3.9.3 Setting the Scene

Moving forwards then, we have argued for an account of NP CP composition for noun complement clauses which vindicates various intuitions and philosophical arguments we saw in chapter 2 and which is also extendable to VP CP composition using pre-existing, off the shelf compositional mechanisms.

We saw how this account has the power to resolve the puzzles we began with at the end of chapter 2, but that the same difficulty of distinguishing between the entailment of the *believe* class and non-entailment of the *discover/know* class still remains.

In chapter 4 I will address this difficulty by offering a different compositional pathway for *discover* class verbs which pivots around combination with a covert determiner to return a definite individual.

[9]This has a resultative, but not predicative reading. It cannot mean 'being an honest man' is true of John.

Chapter 4

Saturation and Clausal Determiners

4.1 Introduction

This chapter looks at the syntactic and semantic structure of apparent CPs in sentential subject position and as the object to 'Presuppositional' verbs. It is argued, following Kastner (2015) that apparent CPs in these positions are in fact DPs headed by a covert D head, Δ.

We first look at the prevalence of overt clausal determiners and where they appear crosslinguistically. Then we review the evidence for an analagous covert structure in English sentential subjects and objects of presuppositional CEVs. I don't intend to present original arguments for this syntactic theory here, only to summarise the existing arguments and suggest a semantics which helps deal with the empirical data.

Following this I show how Kastner's suggestion to treat these DCP clauses as Heimian definites can be easily implemented compositionally, when combined with the Predicativist semantics for CPs argued for in the previous chapter.

Finally we look at how the two resulting strategies for composing a CP with a verb RESTRICT and SATURATE have their distribution governed by the same semantic/pragmatic system that determines the distribution of nominal definites, primarily drawing on MP!. Against Kastner, it is argued that $\Delta$is not selected for by an embedding verb, but is predicted to appear since it simply presuppositionally stronger than the alternative in the context, combining with a bare CP through RESTRICT.

4.2 Overt Clausal Determiners in Other Languages

It may seem surprising to posit determiners, typically associated with taking NP complements, as heads of phrases with CP complements. However, as has been widely observed, many languages do feature an overt clausal determiner. I will not offer a deep analysis of each of these in each language but will highlight and briefly survey some that have been discussed in the literature with respect to clausal composition.

The languages surveyed do not all behave identically with respect to in which environments a clausal determiner appears, nor whether it is obligatory or optional in whatever context, but there are clear trends. Case positions, such as sentential subjects, complements to prepositions, and objects of certain verbs are typical candidates for clausal determiners to surface, and these are typically positions which are of semantic interest to us with respect to the puzzles laid out in chapters 2 and 3.

Another interesting pattern is that all of the surveyed languages, and all languages with clausal determiners to my knowledge, use the same item for a clausal determiner as for a nominal determiner, and that when nominal this determiner is always "definite" in some way, either as a definite article or as the former of a complex, usually proximal but sometimes distal, demonstrative.

This sample should not be taken to be comprehensive, even of those discussed in the literature. Hebrew (Kastner, 2015) and Basque (Adger & Quer, 2001) have also been observed to utilise clausal determiners, and I am confident there are many many more languages which do so for which no work or publication has been done.

Persian

Persian proximal demonstrative '*in*', which is also possible to form complex demonstratives with nominals (Farudi, 2007).

Obligatory in sentential subjects (Aghaei, 2006).

(1) *(In) ke to u-ra da'vat na-kard-i madar-at-ro narahat
this that you he-OBG invitation NEG-did-2SG mother-2sg-OBJ upset
kard.
did.3SG
'That you did not invite him made your mother upset.'

Complements to prepositions.

(2) Sara az in ke dar in mosabeqe barande na-shode
Sarah from this that in this competition winner NEG-become.PRT.3SG

xeyli sharmande ast.
very ashamed be.3SG
'Sara is very embarrassed at this that she didn't win the competition.' (Farudi, 2007)

Can also appear in verbal complements, though this is possible with both presuppositionals ('dunest' 'know') and non-presuppositionals ('fekr' 'think').

Farudi analyses these as DPs with a 'dummy' N for the CP to attach to. Much like (Moulton, 2020).

Greek

Greek definite determiner '*to*' (Roussou, 1992).

Greek has two complementisers '*pu*' and '*oti*'. Only '*oti*' can be used with a determiner. (Roussou, 1992) argues that '*pu*' is a complementiser, but that it functions semantically to provide an individual event. She doesn't give a detailed semantic account, but she does lean on previous semantic accounts where factive complements denote individual events rather than propositions.

(3) *(To) oti lei psemata ine fanero.
the that tell.3SG lies.ACC be.3SG obvious.NOM
'That she tells lies is obvious. (Roussou, 1992)

'*to oti*' is possible in the complements to factive verbs, and it is obligatory in sentential subjects.

Spanish

Spanish definite determiner '*el*' (Plann, 1986; Picallo, 2002; De Cuba & MacDonald, 2013).

Optional in sentential Subjects. [1]

(4) (El) que Juan sea mexicano nos sorprendiò.

Possible as complements to pressupositionals but not to anti-presuppositionals.

(5) a. Descubrí (el) que el puente collapso.
b. Reportò (el) que el puente collapso.
c. Lamento (el) que el puente collapso.

(6) a. Pienso (*el) que el puente collapso.
b. Digo (*el) que el puente collapso.

[1] Thankyou Aneth Gonzalez for these examples.

French

The French demonstrative 'ce' ('this') is obligatory to introduce finite clauses which are the complement of the prepositions 'a' and 'de' (Zaring, 1992; Authier & Reed, 2010).

(7) Il se plaint de *(ce) que personne ne l'aime.
he se complains of this that nobody him.likes
'He complains about the fact that nobody like him.'

(8) Je veillerai a ce que Paul parte.
I will.make.sure to this that Paul leave.
' I will make sure that Paul leaves.'

Zaring (1992) argues the determiner combines with the CP in order to form a DP to satisfy case-marking from the preposition[2].

Czech

The Czech definite demonstrative *to* 'that' commonly heads declarative clauses (Kosta & Karlík, 2020). It is obligatory in sentential subjects, as well as as the complement to some verbs[3].

(9) *(to) že Praha je hezké
that-NOM.SG.N. that Prague-NOM.SG.F. be-PR.3sg. pretty-NOM.SG.N.
město je fakt
city-NOM.SG.N. be-PR.3sg. fact-NOM.SG.M.
that Prague is a pretty city is a fact

(10) vsadil bych si na
bet-PastPart-NOM.SG.M. be-COND.1sg. oneself-DAT.SG. on
*(to), že Praha je hezké
that-ACC.SG.N. that Prague-NOM.SG.F. be-PR.3sg. pretty-NOM.SG.N.
město.
city-NOM.SG.N.
"I would bet that Prague is a pretty city"

Polish

Polish, perhaps unsurprisingly, displays similar behaviour to its close relative Czech[4]

Obligatory with sentential Subjects

[2]Though c.f. Authier and Reed (2010) who argue that a/de-ce-que should be analysed as a single complementiser.

[3]Thankyou to Danny Bate and Karolina Krejsova for the examples.

[4]Thankyou Justyna Losiewicz for the examples.

(11) *(To) ze Praga jest ladnym miastem, zaskoczylo nas.
"That Prague is a pretty city surprised us."

Even when non-factive.

(12) *(To) ze Warszawa jest brzydka, jest nieprawda.
"That Warsaw is ugly is a lie."

Possible with presuppositionals.

(13) Odkrylem (to), ze Warszawa jest ladna.
"I discovered that Warsaw is pretty."

Not possible with antipresuppositionals.

(14) Mysle (*to), ze Warszawa jest ladna.
"I think that Warsaw is pretty."

Russian

(Knyazev, 2016; Bondarenko, 2021b, 2020) the Russian demonstrative determiner 'to' is also obligatory with sentential subjects.

(15) *(To) cto v skafu net xleba bylo objansnen Lenoj.
That COMP in cupboard no bread was explained by.Lena
'That there is no bread in the cupboard was explained by Lena'. (Bondarenko, 2021b)

Further, in cases where the CP is in the position of an oblique argument of a verb it must obligatorily occur with the definite determiner marked for genitive case, following the pattern of nominal arguments.

(16) a. Lena dobilas' podedy/*pobedu
Lena obtained victory.GEN/victory.ACC
'Lena obtained the victory.'

Lena dobilas' *(togo)/*to cto oni prigotovili obed vovremja.
Lena obtain that.GEN/that.ACC COMP they prepared lunch on.time
'Lena succeeded in ensuring that they cooked lunch on time.'

Ga

In the Ga language, a member of the Kwa family spoken in Ghana, the determiner *le*, which also appears with nominals, is obligatory in sentential subjects

and complements to verbs from which elements have been extracted(Korsah, 2017; Korsah & Murphy, 2019).

(17) Ake amlalo le tse too nu *(le) fee man-bii le naakpee
COMP government DEF tear tax top DEF do country-people DEF wonder
'That the government reduced taxes surprised the people.'

(18) Meni ni Kwei yose ake Yemo he *(le)?
what FOC Kwei realise that Yemo buy DEF
What did Kwei realise that Yemo bought?

It should be noted that Korsah and Murphy (2019) do observe that the presence of an overt clausal determiner in the complement of a verb in Ga is not correlated with factivity or presuppositionality, but rather whether something has been extracted.

Others not Reviewed here

Hebrew (Kastner, 2015), Basque (Adger & Quer, 2001).

4.3 Sentential Subjects in English are DPs

It has been widely argued that CPs in subject position are actually enclosed in a DP shell (Ross, 1967) (Alrenga, 2005; Lohndal, 2013) (Takahashi, 2010) (Korsah & Murphy, 2019) (J. Y. Shim & Ihsane, 2017). The central intuition is that sentential subjects show decidedly 'nominal' characteristics in various respects. In this section I review some of the commonly cited evidence for this position as additional evidence for a covert clausal determiner in English.

I will not pursue a detailed semantic analysis of sentential subjects here, but there are clear directions that the analysis of CP complements to verbs offered here gives for such work.

As noted above, many languages have an overt determiner in this position. The inference which I will explore later is that English has a covert determiner which is equivalent to the overt Ds in other languages for sentential subjects.

4.3.1 Movement Paradox

Moved CPs exhibit properties typical of DPs in their base-generated positions, which is used as evidence that the CP is in fact a DP (Takahashi, 2010; J. Shim & Ihsane, 2017). The movement paradox is an example of this (Pollard & Sag, 1994;

Bresnan, Asudeh, Toivonen, & Wechsler, 2015). Moved fronted that-clauses are only possible where the gap licenses a DP, usually as the complement to a case-assigning preposition. These are usually positions from which a CP would not be licensed, hence the paradox.

(19) a. *We can rely on that she will arrive on time.
b. We can rely on the fact that she will arrive on time.
c. That she will rely on time is something we can rely *(on).

(Bresnan et al., 2015)

Alrenga (2005) makes this argument using the 'capture' class (see also (Grimshaw, 1979).

(20) a. This assumption accounts for the fact that these nouns behave differently.
b. The panel deliberated over John's offer to represent them.
c. *This assumption accounts for that these nouns behave differently.
d. *The panel deliberated over that John would represent them.
e. That these nouns behave differently is accounted for by this assumption.
f. That John would represent them was deliberated over by the panel.

Examples from (Alrenga, 2005)

Passivisation is also not possible with CEVs which do not also take DP arguments.

(21) a. Brendan complained that Leicester could not win the league.
b. *That Leicester could not win the league was complained (by Brendan).

4.3.2 Extraction

Perhaps the oldest observation regarding the nominal status of sentential subjects is that extraction is possible from a CP in general, but not a sentential subject.

(22) a. The teacher who it was expected [CP that the principle would hire ___].
b. *The teacher who [DP [CP that the principle would hire ___]] was expected
c. *The teacher who I heard [DP a rumour [CP that the principle would hire___]].

(Ross, 1967)[P241]

4.3.3 Feature Agreement

A more recently revived observation is that sentential subjects can trigger plural agreement on a verb(McCloskey, 1983; Zeijlstra, 2020).

(23) That Joan won the race and that Sara wasn't watching were/*was to be expected.

This ϕ-feature agreement on verbs is typically only triggered by nominals.

4.3.4 Case and EPP

A classical observation is that subjects in English need to be assigned nominative case(Chomsky, 1982). This is often explained in terms of the extended projection principle (EPP), which demands that there always be a DP specifier to T, or that T must assign case and only DPs can receive case (Korsah & Murphy, 2019; Kastner, 2015). Whatever the underlying theoretical explanation, sentential subjects without a DP layer would not satisfy this requirement.

The case bearing, and thus typically nominal or DP, nature of sentential subjects can also be seen when they appear as the subject of a raising infinitive (Božković, 1995; Korsah & Murphy, 2019).

(24) a. *It is likely him to be a liar.
b. *It is likely that he is honest to be surprising.
c. He is likely to be a liar.
d. ?That he is honest is likely to be surprising (to them).

(examples adapted from (Božković, 1995).)

In (24) sentential subjects pattern with nominals in not allowing replacement by a pleonastic subject, and insisting on raising past the matrix verb.

This type of phenomenon is also observed when when CPs appear in ECM constructions, where accusative case is typically assigned.

(25) a. I find him to be a liar.
b. ?I find that he is honest to be surprising.

(examples adapted from (Božković, 1995).)

In (25) it appears as though the sentential subject of the embedded non-finite clause is in the position where we would expect a DP assigned accusative case by the matrix verb.

4.4 Complements of Presuppositionals are DPs

The previous sections reviewed some pre-existing evidence in the syntactic literature for "nominal" or "DP-like" CPs as sentential subjects. This evidence did not directly appeal to the semantic analysis of these structures. In this section I will argue, following several proposals in the literature, most notably (Kastner, 2015), that there is also evidence that the apparently CP complements of the *discover* class, but not the *think* class, of CEVs are also "nominal" or "DP-like". Following previous proposals for both sentential subjects and clausal complements in these environments, most notably (Kastner, 2015), I will argue that these are best analysed as being DPs headed by a covert determiner.

4.4.1 Presuppositional CEVs

The weak islandhood effects of embedded CPs were first identified and discussed by Cattell (1978). Catell proposed a division of CEVs in terms of the 'stance' they make towards a common ground (Stalnaker, 1975, 2002). 'Volunteered stance' verbs report an explicit attempt by the subject of the verb to enter something not already in the common ground into it. They are infelicitous in contexts where the proposition described in the embedded CP is already in the common ground (Cattell, 1978)[pp69-70]. In contrast, response stance verbs require some claim or fact in the common ground to respond to.

(26) **Volunteered Stance**
allege, assert, assume, believe, claim, conclude, conjecture, consider, decide, declare, deem, envisage, estimate, except, fancy, feel, figure, imagine, intimate, judge, maintain, propose, reckon, say, state, suggest, suppose, suspect, tell, think.

(27) **Response stance**
accept, admit, agree, confirm, deny, verify.

(28) **Non-stance Verbs**
comment, convey, convince, detail, doubt, emphasize, forget, mention, notice, point out, realize, recall, recognize, regret, remember, remind.

Kastner (2015) draws the distinction between Volunteered stance verbs on the one hand, and Response and non-stance verbs on the other. Response and non-stance verbs, which are weak islands for extraction, are 'presuppositional' in that they take their objects from discourse referents in the common ground. The corresponding, non-presuppositional, volunteered stance verbs are perfectly acceptable out of the blue to introduce a new question for discussion (Djarv, 2021). Kastner argues that

this semantic/pragmatic contrast is tracked syntactically by the syntactic category of apparent CP complements. Non-presuppositionals have CP arguments, but presuppositionals have their CP arguments enclosed in a DP layer. Proposals of this kind have been suggested before, most notably by Kiparsky and Kiparsky (1971), who argued that the objects of Factives, a subclass of presuppositionals, are in fact DPs with a covert FACT head. Given that not all presuppositionals are factive we will not adopt this proposal here.

Here we will survey some of the evidence adduced in support of DP status of apparent CP complements to CEVs. The goal is not to provide a full semantic or syntactic account of the phenomena discussed below, but simply to invoke them as evidence for the DP analysis of these constructions.

4.4.2 Weak Islandhood

As observed by (Cattell, 1978), the complements to non-presuppositionals can have embedded subjects, objects, and adjuncts extracted from them, whereas the complements to presuppositionals are weak islands to extraction, only objects may be extracted.

(29) a. What do you think that John stole ___?
b. Where do you think John came from ___?
c. Who do you think ___ stole the cookies?
d. Why do you think that John stole the cookies ___?[5]

(30) a. What did you discover that John stole ___?
b. Where did you discover that John came from ___?
c. *Who did you discover ___ stole the cookies?
d. *Why did you discover that John stole the cookies ___?[6]

Examples from (Kastner, 2015)

This can be made even more transparent with 'how' questions, which can be used to question the manner of arrival or the manner of matrix verb-ing.

(31) A: How do you think he arrived?
B: By train.
B': ???Often.

(32) A: How do you believe he arrived?
B: By train.
B': ???More firmly than Mary.

[5]With the low-scope reading for 'why'.
[6]With the low-scope reading for 'why'.

(33) A: How did you say he arrived?
B: By train.
B': ?Loudly.

(34) A: How do you propose we travel?
B: By train.
B': ???With conviction.

Contrast this with the presuppositionals.

(35) A: How do you know he arrived?
B: *By train.
B': Because he just walked in and stole my petunias.

(36) A: How did you forget he arrived?
B: *By train.
B': Because I was distracted by my missing petunias.

(37) A: How did you discover he arrived?
B: *By train.
B': By watching his car pull up.

This parallels DNCP complements which, expectedly for full DPs, are always strong islands.

(38) A: How did you discover the fact that he arrived?
B: *By train.
B': By watching his car pull up.

(39) A: How did you think the thought that he arrived?
B: *By train.
B': With great effort.

Here we see CP complements to presuppositional, but not non-presuppoositional, CEVs showing extraction behaviour characteristic of DPs.

4.4.3 Proforms

It has been observed that there is a very imperfect correlation between selection for the typically DP proform "it", and the typically CP proform "so" with the contrast between presuppositionals and non-presuppositonal (De Cuba & Urogdi, 2010; Potts, 2002). The distinction between these two proforms has previously been chached out by stating that "so' replaces something predicational, while 'it' stands for something referential.' (Bhatt, 2010) (Kiparsky & Kiparsky, 1971).

If non-presuppositionals combine either with a referential DP or through RESTRICT with a predicational CP, then we would expect them to be compatible with either CP or DP proforms.

(40) a. John thought so.
b. John hopes so.
c. ?John wishes so.

(41) a. John thought it/that (too).
b. John hoped it/that.
c. John wished it/that (too).

In contrast for pressuppositionals the predicational CP is embedded under a DP layer and so is less available to be substituted by a CP proform. We would expect a full DP proform to be strongly preferred here. This predicts that both CP and DP proforms should be available, but they should be strongly dispreferred for discover-class.

(42) a.???John discovered so.
b.???John regrets so.
c. ??John reported so.

(43) a. John discovered it/that.
b. John regretted it/that.
c. John reported it/that.

This divide in compatibility with proforms across the two classes has been borne out experimentally over a wide range of CEVs (White & Rawlins, 2018). One notable exception to this general rule is 'know', which is very comfortable with a CP proform.

(44) John knows so (too).

We will not explore this exception more deeply here, but it is worth highlighting that it is unclear from our current perspective what the operative contrast between 'know' and the rest of its class is here.

Note as well to reinforce the parallels that 'so' is not possible as a subject, because it isn't a DP, where 'it' clearly is (Potts, 2002) (Moulton, 2009b).

(45) a. That the giants won the world series surprised them.
b. *So surprised them.
c. It surprised them.

4.4.4 Availability of MCP

It has been reported, at least since Hooper and Thompson (1973) that a subset of Main Clause Phenomena occur within the embedded clause of non-Presuppositional predicates, but not Presuppositionals. Examples adapted from (Hooper & Thompson, 1973; Heycock, 2017; Nye, 2013).

Topicalisation

(46) a. This book, Mary read last semester.
b. John thought that this book, Mary read last semester.
c. *John reported that this book, Mary read last semester.

Locative Inversion

(47) a. Beyond the next hill stood a large fortress.
b. She believed that beyond the next hill stood a large fortress.
c. *She forgot that beyond the next hill stood a large fortress.

Negative Preposing

(48) a. Never in his life had he seen a hippopotamus.
b. He claimed that never in his life had he seen a hippopotamus.
c. *He discovered that never in his life had he seen a hippopotamus.

These contrasts are not perhaps as robust as we might like. Hooper and Thompson (1973) admits that there are apparent counterexamples amongst the semi-factives and it has been observed in subsequent literature that many speakers judge presuppositionals with MCP to be far more acceptable than was reported in the original judgements(Aelbrecht, Haegeman, & Nye, 2012).

Haegeman (2012) argues that MCP is not possible in factive clauses because of additional structure not going so far as to claim that this is definitely DP structure, but at the very least this demonstrates another clear parrallel between the behaviour of complements of presuppositional CEVs and DPs more broadly (Hooper & Thompson, 1973; De Cuba, 2017).

4.4.5 Coordination of DPs and CPs

DPs can be coordinated with CPs in the complements of presuppositionals, but not anti-presuppositionals

(49) a. *John thought something wild and that Mary would be home for dinner.
b. John discovered something wild and that Mary would be home for

dinner.

To the extent that coordination is a test for same syntactic category and/or semantic type, a job which it does at best imperfectly, this is evidence in favour of our analysis of the clausal complements to presuppositionals as being DPs in contrast to the clausal complements to non-presuppositionals.

4.4.6 Omissability of the complementiser

It has been observed that complementiser drop less acceptable with presuppositionals than it is with non-presupositionals (J. Shim & Ihsane, 2017; J. Y. Shim & Ihsane, 2017), and completely unacceptable with sentential subjects (D. Pesetsky & Torrego, 2001, 2004).

(50) a. John said/thought/hopped (that) she would be home on time.
b. John reported/discovered/knew ??(that) she would be home on time.
c. *(That) she would be home on time suprised John.

Note that the claim is not that complementiser is impossible with presuppositionals, but that there is a clear reported contrast in acceptability with complementiser dropping across our classes (J. Shim & Ihsane, 2017).

In this respect we see the objects of presuppositional CEVs behaving like full DNCPs, for whom complementiser drop is also possible, but much less acceptable. It has been claimed that complementiser drop for DNCPs is in fact impossible (D. Pesetsky & Torrego, 2001), but whilst as noted it is often dispreferred, some examples are readily available.

(51) a. I can't imagine a scenario where I would need proof (that) I bought a doughnut.
b. The fact (that) we're here should demonstrate our interest.

Again, though we are not in a position to offer a complete analysis for the conditions under which complementisers are omissable, we do observe again the same pattern of the objects of pressupositional CEVs behaving like DPs in contrast to non-pressuppositional objects.

4.4.7 Sequences of Tenses

It has also been reported that certain sequences of tenses which are allowed for presuppositionals are not allowed for non-presuppositionals. Ormazabal and Uribe-Exebarria (1996) report that the sequence [past] + [*will*] is allowed in a TC

embedded under a presuppositional verb, but not under a non-presuppositional.

(52) a. *John thought that he will arrive tomorrow.
b. *John hoped that he will arrive tomorrow.
c. *John believed that he will arrive tomorrow.

(53) a. John discovered that he will arrive tomorrow.
b. John regretted that he will arrive tomorrow.
c. John reported that he will arrive tomorrow.

Again, like with presuppositionals these sequences of tenses are possible in DNCPs.

(54) John reported the fact that he will arrive tomorrow.

4.4.8 Slifting and Fragment Answers

Slifted clauses, investigated in (Ross, 1975), show a clear preference for non-presuppositionals over presuppositionals.

(55) a. George will be home on time, Luke claims.
b. George will be home on time, Luke thinks.
c. George will be home on time, Luke hopes.
d. George will be home on time, Luke believes.

(56) a. *George will be home on time, Luke discovered.
b. *George will be home on time, Luke regrets.
c. *George will be home on time, Luke reports.
d. *George will be home on time, Luke expects.

The full picture of why this preference exists is likely to transcend the syntax-semantics discussed so far, at least since a condition for slifting is that the slifted clause be at-issue-content. We will return briefly to how this relates to the analysis of clausal embedding offered here in chapter 6, but for now it is simply worth remarking on another set of contrasts.

We can observe a related set of contrasts in fragment answers with parantheticals.

(57) a. A:Who just won the cup?
I think Liverpool
b. Gary claims Liverpool.
c. I hope Liverpool
d. I believe Liverpool.
e. #I know Liverpool.
f. #I regret Liverpool.

g. #Gary reports Liverpool.

Again we see a clear preference for non-presuppositionals, though also again we can see that at-issue-ness must clearly be in play for a full explanation of this phenomenon, which we will not pursue here.

4.4.9 '*Explain*'

'*Explain*' can give a explanans or explanadum reading to it's complement.

(58) a. John explained that the bridge collapsed (, when asked why the road was closed/# when asked why the bridge collapsed).
b. John explained the fact that the bridge collapsed (, #when asked why the road was closed/when asked why the bridge collapsed).

We won't give a full account of why this is the case, but for now it is useful to observe the generalisation that DPs seem to correspond to explanadum and CPs to explanans. The verb 'explain' is notoriously difficult to analyse with respect to its argument structure (Pietroski, 2000; Elliott, 2016; Bondarenko, 2021b), but at the very least we can say that 'explain' shows a complex argument structure involving an explanans role typically (but not always) realised as a CP, and an explanadum role , usually contrued as the theme and typically realised as a DP.

How is explain likely to behave with respect to bare CPs and CPs inside of DP-shells then according to our analysis? According to our classification 'explain' is a verb of saying, creating its object and therefor being non-presuppositional. Here the CP combines as described in chapter 3 through RESTRICT and characterises the content of the explanation.

However it has been observed in languages with an overt clausal determiner that clausal complements to verbs with a similar meaning to 'explain' show a contrast in thematic role depending on whether the clause is accompanied by a determiner. Clauses withput a determiner will realise the role of explanans, just like in English, but those with will behave like full DPs in realising the explanandum role. This has been pointed out for Hebrew (Kastner, 2015), Spanish (Picallo, 2002), and Buryat (Bondarenko, 2021a) but is also true of Polish and Czech verbs with the clausal complementiser 'to'[7]. Two relevant examples are listed below.

(59) Juan explico [CP que el puente collapso]
"John explained that the bridge collapsed"

(60) Juan explico [DP el [CP que el puente collapso]]

[7]Thankyou to Justyna Losiewicz and Danny Bate for these observations.

"John explained why the bridge collapsed."

(61) Wytlumaczylem [CP ze droga byla zamknieta].
"I explained that the road was closed."

(62) Wytlumaczylem [DP to [CP ze droga byla zamknieta]].
"I explained why the road was closed."

Furthermore Bondarenko (2020, 2021a) has shown that in Russian, which like English does not have an overt clausal determiner but also like English shows a contrast between DP-like and non-DP-like clauses, the same contrast between true CP explanans clauses and DP explanadum clauses can be observed and tested for using some of the battery of diagnostics presented earlier in this chapter, most notably as used by Bondarenko, weak islandhood. This is an intriguing insight for languages with covert clausal determiners, though it is at present unclear why this behaviour should be observable in Russian but not in English.

4.4.10 Deverbal Nominalisations

Complex event nominalisations, and -ing nominalisations such as 'the bridge's collapse' or 'Rob's singing' denote individuals of a particular sort, reasonably understood given their derivation to be events (Grimshaw, 1990; Sennrich, 2020).

Higginbotham (2009) argues that these constructions carry a definiteness presupposition, though it is not entirely clear what this is, whether they have to reference/attempt to accommodate something in the common ground or they bring with them some equivalent of 'factivity' in that the described event must actually have occurred. Congruent with this account, these nominalisations are compatible with presuppositional CEVs but not with non-presuppositionals.

(63) a. *John thought the bridge's collapse/the collapse of the bridge.
b. *John supposed the bridge's collapse/the collapse of the bridge.
c. *John claimed the bridge's collapse/the collapse of the bridge.
d. *John believed the bridge's collapse/the collapse of the bridge.

(64) a. John discovered the bridge's collapse/the collapse of the bridge.
b. John regretted the bridge's collapse/the collapse of the bridge.
c. John reported the bridge's collapse/the collapse of the bridge.
d. John expected the bridge's collapse/the collapse of the bridge.

Likewise gerunds are incompatible with anti-presuppositionals but compatible with (many) presuppositionals(Cattell, 1978; Sennrich, 2020).

(65) a. *John thought Rob's singing.

b. *John supposed Rob's singing.
c. *John claimed Rob's singing.
d. *John believed Rob's singing.

(66) a. John discovered Rob's singing.
b. John regretted Rob's singing.
c. John reported Rob's singing.
d. John expected Rob's singing.

4.5 Semantics of D

There is ample evidence then that the clausal objects of a certain class of verbs which we have called presuppositionals are CPs with a DP layer formed by a covert clausal determiner. But if apparent CP complements to this class of verbs are in fact DCPs, how should we understand their semantics?

One obvious approach, already alluded to in chapter 2, would be to assume they denote facts (Kiparsky & Kiparsky, 1971; Moffett, 2003, 2005). This meshes nicely with the observation that all factives are presuppositional, but ofcourse we know that not all presuppositionals are factive, and not all sentential subjects are factive.

(67) a. John reported that it was raining, but it isn't raining.
b. That this exam is easy is a common lie.

Given that the syntactic and semantic behaviour which lead us to the DCP analysis encapsulates more than just factives, and for the philosophical reasons raised in section 3.6. it would be best to instead lean away from this reduction to every case of presuppositional CEVs as taking 'facts' as objects.

One clue which might lead us in the right direction is that the corresponding overt determiners in languages which have them must always be definite. As we saw in 4.2. whilst every language which we have seen uses a clausal determiner which is also a nominal determiner, no language we have encountered is utilises an indefinite determiner with a clause. This hints that the appearence and use of DCPs is controlled by semantic-pragmatic factors relating to information structure and/or other definiteness related phenomena. Let us then survey some existing ideas about what this might be.

(Kallulli, 2006, 2009) argues that these are pressuppositional and draws a parrallel between how definite determiners are used in languages such as spanish precisely for the purpose of deaccentuating a presuppositional element. Related ideas can be seen in (Melvold, 1991), where factive clauses are explicitly analysed as *definite*, in (De Cuba, 2017), where clausal objects of presuppositionals are seen as *referential*,

and in (Kallulli, 2006) and (J. Shim & Ihsane, 2017) where it is suggested that the relevant clauses may be *familiar* or *given*.

We will pick up this thread and see what it means for the system as a whole in the following chapter. For now seeing the clear parallel with definite determiners in the nominal domain is enough for us to attempt to build up a semnatics for the constructions simply by leaning on what we already know about definite determiners from well established analyses of nominal DPs.

4.5.1 A Compositional Semantics for Δ

Kastner proposes to treat Δas Heimian anaphoric definite(Kastner, 2015; Heim, 1990). We built on this by incorporating it with the predicative semantics for CPs.

As we have seen, crosslinguistically this determiner is identical to a definite nominal determiner. Bondarenko (2020) has proposed analysing the Russian clausal determiner in the same away as the nominal determiner, namely as an iota-operator. Bondarenko (2020) and Hanink and Bochnak (2017) both propose that this treatment of definite clauses in Russian and Washo respectively could be extended to English DCPs as complements to presuppositionals.

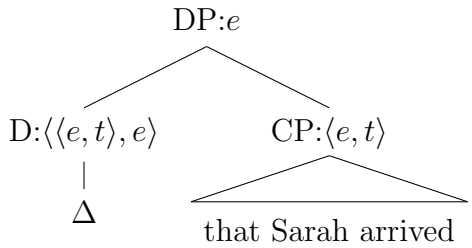
Following this suggestion the simplest assumption to make is that the English cover clausal determiner, Δ, has an equivalent semantics to the overt definite determiner in English 'the'.

(68) $\llbracket \Delta \rrbracket = \lambda F_{\langle e,t \rangle}.\iota x(F(x)) = \llbracket \text{the} \rrbracket$

This will allow for the possibility of parallel analyses of the structures in Spanish, Greek, and Persian, where we can preserve a uniform semantics for the overt determiners, whether they combine with a NP or a CP.

This allows us to propose the following sample derivation for a DCP "that Sarah arrived".

(69)



$\llbracket \Delta \rrbracket = \lambda F_{\langle e,t \rangle}.\iota x(F(x))$

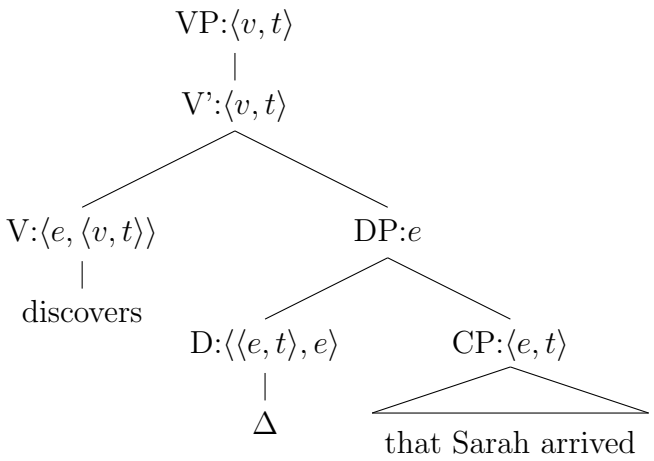
$\llbracket \text{that Sarah arrived} \rrbracket = \lambda x_e.\mathfrak{F}_{\text{cont}}(x) = \textit{Sarah arrived}$

$[\![[\mathbf{DP}]]\!] = \iota x(\mathfrak{F}_{\text{cont}}(x) = \textit{Sarah arrived})$

Δcombines with the predicate denoting CP just like a definite determiner would with any nominal. The denotation of the Δ-headed DP will be the unique individual whose content is that Sarah arrived.

The structure is then of the right semantic and syntactic types to be embedded by a presuppositional CEV just the way that we have seen full nominal DPs do so. A sample derivation up to the VP is given here:

(70)



$[\![\textit{discovers}]\!] = \lambda x_e.\lambda e_v.\textit{discover}(x)(e)$

$[\![\Delta\ ]\!] = \lambda F_{\langle e,t\rangle}.\iota x(F(x))$

$[\![\text{that Sarah arrived}]\!] = \lambda x_e.\mathfrak{F}_{\text{cont}}(x) = \textit{Sarah arrived}$

$[\![[\mathbf{DP}]]\!] = \iota x(\mathfrak{F}_{\text{cont}}(x) = \textit{Sarah arrived})$

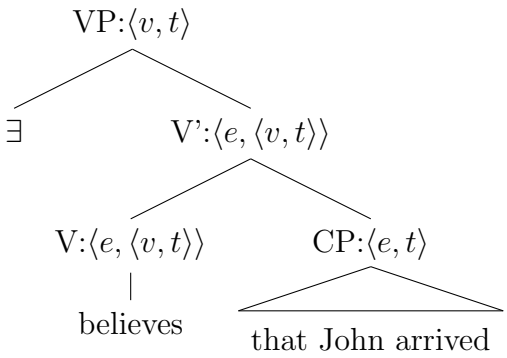
$[\![[\mathbf{V'}]]\!] = \lambda e_v.\textit{discover}(\iota x(\mathfrak{F}_{\text{cont}}(x) = \textit{Sarah arrived}))(e)$

We first form the DP as described above by combining the definite Δoperator with the predicative clause to form a DP with the type of denotation we might expect for a nominally based DP. This type e DP is then of exactly the right to combine by SATURATE with the internal argument taking verb '*discover*' to return a predicate of events. Again this system exactly parallels what we would expect for verbal composition with a DP formed from a nominal. An external agentive argument can then be added on top in the standard davidsonian way, just as discussed in chapter 3.

Treating our covert determiner Δsimply as an iota operator just like a nominal definite determiner allows us to generate a composition without having to make any additional assumptions, and even better as I will argue in the remainder of this chapter and implement in the following chapter, it generates the *correct* semantic result.

For convenience of comparison I copy here the RESTRICT driven composition for non-presupositionals given in 3.7.

(71)



$[\![believes]\!] = \lambda x_e.\lambda e_v.believe(x)(e)$

$[\![\textbf{[CP]}]\!] = \lambda x_e.\mathfrak{F}_{\text{cont}}(x) = \textit{John arrived}$

$[\![\textbf{[V']}]\!] = \lambda x_e.\lambda e_v.believe(x)(e) \wedge \mathfrak{F}_{\text{cont}}(x) = \textit{John arrived}$

$[\![\textbf{[VP]}]\!] = \lambda e_v.\exists x(believe(x)(e) \wedge \mathfrak{F}_{\text{cont}}(x) = \textit{John arrived})$

4.5.2 Presuppositionals, Non-presspositionals and Anti-presuppositi

Now that we've shown that a composition with a predicative CP and a standard definite determiner is technically possible, why should we believe that this gives us the kind of result that we need, given our arguments about the semantics of these clauses and the puzzles we set up as desiderata in chapter 2?

First let's sketch in broad terms what our expectations are for the lexical semantics of each of the verb classes we've been working with.

Presuppositonals

The driving intuition behind the presuppositional class is that verbs like '*discover/know/report*' are responsive to something in the common ground. Claims or facts are common candidates for such common ground objects, but there may be others. An exact typology is beyond the scope of this thesis and more likely a job for Philosophers of language, but it is a standard assumption that some such objects exist and must be grammatically accessible, given the possibility of anaphorically referencing them.

(72) A: [John ran all the way to the other town]$_i$.
B: Yeah, that$_i$ was crazy.

I wish to remain as neutral as possible with respect to exactly what objects are possible to pick out here and how we are to understand the 'definiteness' of presup-

positional clauses. What is important for our purposes is that this definiteness or presupposition is implemented grammatical by exactly the same pre-existing system already in place for definiteness in nominals. Whether these are familiar ideas (Kallulli, 2006), existing claims, facts (Fine, 1982; Moffett, 2003) or 'given' assumptions (Kallulli, 2009) as have been variously proposed is not important for our implementation. The only operative assumption we need to work with is the fairly uncontroversial one that whatever is picked up is in the common ground and accessible to definites in the usual Heimian way as we expect with nominals.

The composition in 4.5.1 implements this with as little theoretical baggage as possible with respect to our ontology of the common ground. Recall again to prevent us from falling back on the proposal of Kiparsky and Kiparsky (1971) that though certainly factivity is an interrelated concept here, since all factives are presuppositionals, as we have seen many times factivity is only one type of presupposition since non-factive 'report' is also subsumed here. Facts are simply not enough here.

Whatever ends up being the objects in the common ground that are picked up on by our anaphora and our clausal determiners, the system described in this thesis will accomodate them.

Anti-presuppositionals

Certain CEVs are *anti-presuppositionals*, that is they cannot pick as an object something which already exists in the common ground. The clearest case of when this might happen is when the CEV is a type of verb of creation (B. Levin et al., 2005). Verbs of speaking like '*say/claim*'[8] 'create' their object in a manner parralel to B. Levin et al. (2005)'s classical verbs of creation like '*build*'.

(73) John built a house.

When our verbs of speaking take a DP direct object the object is the unique token utterance generated by the speech, even if that type of speech (maybe sharing its content) might have been said before.

(74) John said something crazy yesterday.

Moltmann (2013) describes these as 'affected objects'. Since these objects are created by the even described by the verb they cannot possible be anaphorically taken from the common ground and so the SATURATE pathway is not available to them. The consequences of this for our system will be spelled out more fully in the chapter 5, but for now note how this assumption is enough to force some CEVs to not com-

[8] And '*think*', to the extent that 'thinking' can be analysed as 'saying in your head' (Moltmann, 2004a)

pose through combination with a definite determiner and instead take the RESTRICT pathway described in chapter 3.

Non-presuppositionals

Whilst most of the verbs which embed true CPs can be characterised as anti-presuppositional verbs of creation, we should pay some special attention to one particular member of the superclass of non-presuppositionals, that is verbs which neither necessarily pick up on an object in the common ground nor necessarily cannot. A verb in this class which has been given much attention in the literature and has featured heavily in this work is '*believe*'.

'*Believe*' demonstrates strange behaviour. It behaves as a non-presuppositional with respect to entailment and extraction, but like a presuppositional with respect to DP/CP coordination. Furthermore Kallulli (2006) argues that believe can trigger factivity in certain contexts.

(75) Can you believe that it's raining?!

Given our claims that factivity is a sufficient property for membership of the presuppositional class where does this leave the status of '*believe*'?

Intuitively, believe does not have an affected object. You can believe other peoples beliefs, as well as theories, rumours or claims that pre-exist your believing them. It is therefore not incompatible with SATURATE in the way that anti-presuppositionals are. However it is also true that unlike presuppositional '*know*' which is inherently dependent on some fact (or related entity), '*beliefs*' can be original, and so generated by their believing event. Note that even original knowledge or discovery does not *create* the fact discovered or known in doing so.

We would expect the behaviour of '*believe*' then to be mixed. Where it clearly picks up on and is responsive to an existing claim or fact then it is available to compose through SATURATE, but when it is original this path is unavailable it must compose through RESTRICT.

In the hybrid cases then, where either path is available for '*believe*' in certain environments, or for presuppositionals always, what determines which path will be used? In the following section I will build on existing theories that govern definiteness for nominals to show how we can predict the correct behaviour.

4.6 Common Ground and MP!

The system we have built and the assumptions we have made rule out the possibilty of the SATURATE path for anti-presuppositionals, correctly predicting the

syntactic and semantic behaviour we see in chapters 3 and 4[9]. However there is no mechanism that we have yet discussed that rules out presuppositionals from sometimes combining using the RESTRICT pathway as outlined in chapter 3. Why then, unlike with '*believe*', do we NEVER see the syntactic and semantic behaviour associated with this pathway (non-islandhood, failure of entailment) for presuppositionals? Why is it that they cannot optionally use this pathway?

Fortunately such a mechanism to force a choice to the presuppositionally stronger option is already necessary given what we know about definiteness in the nominal domain. When a choice is available between a definite and indefinite article the use of the indefinite article conveys an inability to commit to the presupposition of the definite article. This functionally generates an *anti-presupposition* for indefinites.

(76) a. [A man]$_i$ walked into a bar. [The man]$_{i/\#j}$ bought a drink.
b. [A man]$_i$ walked into a bar. [A man]$_{\#i/j}$ bought a drink.

In (76), we can see that the use of the indefinite is blocked when the stronger definite is available if the man has already been introduced into the common ground.

An old, though not entirely uncontroversial, principle which governs this behaviour is Maximise Presupposition! (MP!) (Heim, 1990). One standard formulation of this principle is as follows.:

(77) **MP!** : If ϕ, and ψ are contextually equivalent alternatives, and the presuppositions of ψ are stronger than those of ϕ, and are met in the context of utterance c, then one must use ψ. (Singh, 2011)[p4]

Though there are still many open question about exactly how this principle is to be formulated and on what levels it operates, something which does this job must hold in order to explain the clear behaviour we see in (76).

Fortunately for us MP! can be extended straightforwardly to cover our case of presuppositionals and force the choice of SATURATE and so explain the unavailabilty of RESTRICT.

Observe that the denotation of 'discover that P' generated by the SATURATE pathway in (78) is presuppositionally stronger than the a putative denotation from the hypothetically available RESTRICT pathway in (79)

(78) $[\![\text{[Discover that P]}_{\text{SATURATE}}]\!] = \lambda e_v.discover(\iota x(\mathfrak{F}_{\text{cont}}(x) = P))(e)$

(79) $[\![\text{[Discover that P]}_{\text{RESTRICT}}]\!] = \lambda e_v.\exists x(discover(x)(e) \wedge \mathfrak{F}_{\text{cont}}(x) = P)$

The iota operator imposes the presupposition that there be a (and possibly only

[9]And the same can be extended to non-presuppositionals like '*believe*', WHEN they have a non-presupposed, original, object.

one) available individual in the common ground for which it's selected predicate is true. (79) lacks such a restriction.

Since our assumptions have lead us to the conclusion that these are both available for presuppositionals, and the presuppositions of (78) are stronger than those of (79), MP! determines that we must use (79). In chapter 5 we will cache out more fully what this predicts about the other contexts in which such a choice may be , but for now this is enough to resolve the initial difficulty of forcing SATURATE over RESTRICT for presuppositionals.

It's worth pointing out that construed in this way the initially odd behaviour of CEVs in dividing into two classes becomes simply an expected extension of the system governing definites and indefinites which is already well established for the nominal domain. Given standard assumptions about semantic composition from Chung (2001), and the mechanism of MP!, we would predict that SATURATE would always be used over RESTRICT when it is available as is the case for presuppositionals, and RESTRICT will only and always be used when SATURATE is ruled out since the presupposition cannot be met as in anti-presuppositionals.

Our two classes of CEVs then are generated straightforwardly based on their lexical semantics in how they pick out their internal argument. If the internal argument responsive to something in the common ground they can, and therefore must, SATURATE. If the internal argument is created by the event and so cannot be already in the common ground, then they cannot SATURATE and so must RESTRICT. If the lexical semantics of the CEV does not push in either of these directions, as with non-presuppositional '*believe*', then the choice of pathway will be determined by the locally relevant factor of whether the internal argument was in fact original or responsive to the common ground.

4.7 Comparison with other Approaches

Here it worth taking a step back and noting some related proposals to this approach, and justifying why the theoretical choices we have made here have been made.

The composition explored in this chapter is reminiscent of the proposal of Kiparsky and Kiparsky (1971), where a covert DP 'the fact' first composes with a CP and then composes with a presuppositional CEV just like a full DP would. Our proposal shares many of the advantages of this proposal in going some way to explaining the syntactic behaviour of CEVs and validates many of the core intuitions of that proposal. However the proposal of this thesis advances on this by being also able to capture non-factive presuppositionals, which share the syntactic behaviour of presuppositionals, and in that it invokes less covert material, only utilising a D instead

of a full D and NP.

Moulton (2020) agrees that the objects of presuppositional CEVs are DPs but argues that these (D) + CP structures in languages like Spanish and Persian also have a covert noun, making the (D) + (N) + CP. This is a more sophisticated variant of the original approach in Kiparsky and Kiparsky (1971), which improves upon it by not tying down the covert noun to 'fact' and so being able to accomodate our non-factive cases. I will not argue directly against this view here, it was not implemented since the evidence for a covert N is in my view less compelling than the evidence for a covert D (which also features in Moulton's account). We should note that the solutions to the semantic phenomena which this thesis addresses would be the same whether a covert N is included in the structure or whether the type of individual is determined contextually and extra-linguistically as we have implemented in this proposal.

4.8 Solving the Remaining Puzzles

Let us return now to our motivating puzzles in the preceding chapters and see how this account of presuppositionals addresses them. The solutions to quantificational inferences, selectional restrictions and variability of attitude objects directly parallel the solutions for non-presuppositionals, since all CEVs take individual e-type internal arguments, and so we will only go through them briefly. However the differences introduced in this chapter between presuppositionals and non-presuppositionals allow us to explain the puzzling non-entailment of presuppositionals which was left hanging at the end of chapter 3.

4.8.1 Quantificational Inferences, Selectional Restrictions and Variability of Attitude Objects

Under the SATURATE pathway presuppositionals like discover take a direct object DP and so quantificational inferences are generated straightforwardly like we might expect for any DP.

(80) a. George discovered that his hand is real.
b. $\exists e \exists x(AGENT(e)(g) \wedge discover(\iota x(\mathfrak{F}_{\text{cont}}(x) = \textit{his hand is real}))(e)$

(81) a. George believes something.
b. $\exists e \exists x(AGENT(e)(g) \wedge discover(x)(e))$

Like what we saw with the RESTRICT generated non-presuppositionals, (81) can be infered from (80) by existential generalisation.

As we noted in 3.8.2 the key to explaining selectional restrictions and variability of attitudinal objects is to see CEVs as fundamentally taking an *e*-type argument, protypically but not exclusively realised as a nominal DP. The introduction of SATURATE with covert D headed DCPs does nothing to affect this and so presuppositional CEVs are free to impose exactly the selectional restrictions on their nominal internal arguments as we required in the previous discusion in 3.8.2.

4.8.2 Nonentailment

Recall from the end of chapter 3 that since RESTRICT generates the DP CP to CP entailments universally, it was puzzling that a class of our CEVs do not attest to this entailment. Knowing now that this misbehaving class combines instead through SATURATE, we can see that the resulting meanings predict a failure of entailment for presuppositionals, just as we observed in chapter 2.

(82) a. George discovered that his hand is real.
b. $\exists e \exists x(AGENT(e)(g) \wedge discover(\iota x(\mathfrak{F}_{\text{cont}}(x) = \textit{his hand is real}))(e)$

(83) a. George discovered the fact that his hand is real.
b. $\exists e \exists x(AGENT(e)(g) \wedge discover(\iota x(fact(x) \wedge \mathfrak{F}_{\text{cont}}(x) = \textit{his hand is real}))(e)$

Since the DCP in (82) denotes some definite object in the common ground, the entailment from discovering one thing with content P, to discovering a fact with that content does not go through. The entailment is as unlicenced as it would be for nominal DPs like in (84),.

(84) John fed that dog ⊮ John fed my uncle's dog.

The fact that SATURATE is used for presuppositionals and RESTRICT for non-presuppositionals gets the missing piece of our puzzle into place. Presuppositionals do not licence the entailment from DPCP to DCP, but non-presuppositionals do licence the entailment from DPCP to CP.

4.8.3 Putative Counterexamples: Accept/Deny

Before moving on to a broader application of the system we have built in the preceding two chapters, I will first briefly address two putative counterexamples.

The CEVs '*accept*' and '*deny*' should come out as presuppositional according to the diagnostics established in this chapter. They are weak islands, do not allow MCP, and intuitively seem clearly to be responsive to some claim or fact in the common ground. And yet, counter to the predictions of our analysis of presuppositionals they do in fact seem to licence an entailment from DPCP to DCP.

(85) a. John accepted the theory that the Earth is round. ⊩
b. John accepted that the Earth is round.

Which should note however that this does not hold for all DP objects of '*accept*', but only a certain range of them. Whilst the entailment is licensed for '*theory*' in (85), it is not licensed for '*order*' in (86).

(86) a. John accepted the order that the prisoners should be shot. ⊮
b. John accepted that the prisoners should be shot.

Uegaki (2015a) has also notes that 'know', another classic presuppositional, does also licence an entailment in the specific case where the noun in the DP is 'fact'.

(87) a. John knew the fact that the Earth is round. ⊩
b. John knew that the Earth is round.

Knowing that these entailments are generally blocked and only licensed in specific circumstance should be enough to assuge our worries that there is something deeply wrong with our theory, but Uegaki also offers a concrete explanation for the exceptional entailment of '*know*' with '*fact*' depending on the specific lexical semantics of '*know*' and it's relation to factive objects. Whilst not pursued here, it is likely that a similar understanding of the lexical semantics of '*accept/deny*' would prove sufficient to explain the exceptional cases for which the entailment does go through without compromising the generalisation that still applies to their non-entailing instances.

4.9 Summing up

Over chapters 3 and 4 we have built a system of two different pathways that predicational CPs may use to compose with CEVs. We further explored how mechanisms in the nominal domain, in particular definiteness and MP!, can be used to explain the conditions under which one pathway is used rather than the other. The resultant system is powerful enough to generate all the requisite compositions with both classes of CEVs and gives a semantics which correctly solves the puzzles that drove us from chapter 2.

In the following chapter I will aim to apply this system to some traditional problems in the syntax-semantics interface, and point out places where it may be able to help us make some fruitful progress.

Chapter 5

Arguments, Case and the Calculus of Clausal Embedding

5.1 Introduction

In the previous chapter we saw how DCPs which combine with presuppositional CEVs through the SATURATE pathway, and true CPs combine with non-presuppositionals via RESTRICT.

In this chapter I'd like to explore how these two competing compositional strategies play out on the wider stage, particularly with respect to arguments of verbs. The leading idea here is that MP!, discussed in the previous chapter, and case assignment can be used to explain where CPs are realised and how they are interpreted. The crucial insight is that whilst SATURATE is the presuppositionally stronger strategy, and so will be preferred when the presupposition is met, CPs sometimes occur in positions where case cannot be assigned, and in those positions they must be combined through RESTRICT.

5.2 Background

In the literature in the syntax-semantic interface on argument realisation, it is frequently presumed, often unreflectively, that all thematic arguments must be DPs. Chierchia (1989, 1985) argues on the basis that thematic arguments can only be low, and specifically *e*-type or adjacent types. The *Visibility Criterion* (Chomsky, 1982; Aoun, 1980) restricts arguments which are visible for thematic role assignment to only those which have been assigned case, and thus only to DPs.

CPs have traditionally been problematic from these points of view. Traditionally it has been claimed that CPs are caseless and phi-featureless (Picallo, 2002) and that case cannot be assigned to a CP without a D layer (Bittner & Hale, 1996). The

theory therefore predicts that they cannot be arguments, and yet they appear to be appearing in argument positions, like the subject or object of a verb. Some attempts to accommodate their behaviour have however been made.

Stowell (1982) uses the principle of Case Resistance to explain why CP 'objects' always appear extraposed to the right, purportedly so that do NOT appear in a genuine case, and therefore thematic, position.

For Rosenbaum (1967) clauses must be nominalised in order to serve as arguments to verbs. This generalisation is not made based on the kind of syntactic and semantic argumentation explored in this thesis, but because it is a direct consequence of theoretical commitments in the rest of our theory of grammar.

D. M. Pesetsky (1982); D. Pesetsky (1993); D. M. Pesetsky (1996) explores the hypothesis that argument selection in general can be explained primarily in terms of case marking.

Baker (Baker, 1997, 2003, 2015) brushes aside this problem in a footnote by commenting that whilst CPs do not have case-features, something which is typically the marker of a verbal argument, they are still able to function as if they were arguments because they are 'bearers of a referential index' (Baker, 2003)[p112]. It is not easy to see however, how CPs fit into the broader picture of the case and theta-systems which Baker makes so well behaved for nominals.

The system developed in chapters 3 and 4 is actually very consistent with the core claims of each of these authors. CPs never come out as being true thematic arguments. Everything that looks superficially like a CP argument is either not a CP or not an argument. The embedded clauses of non-presuppositional CEVs are modifiers of an existentially generalised internal argument, not realisations of that argument. Similarly sentential subjects and CP objects of presuppositional CEVs are infact enclosed in a DP layer allowing them to satisfy the case theoretic requirements of Chomsky (1982), Aoun (1980), and Stowell (1982), and the type theoretic requirements of Chierchia (1989). In this way apparent CP complements can be rehabilitated to appear normal against the background assumptions of the link between case and thematic role.

Because of this there's reason to be hopeful that all arguments are syntactically DPs and semantically e-type. To my knowledge the only two live candidates for thematic arguments other than DPs are PPs and CPs. PPs have been argued to just prop up case assignment (D. M. Pesetsky, 1996; Melchin, 2019) and allow for their complemented DPs to be assigned the appropriate thematic role. They appear more superfluous to the theta-system when we observe languages with a more robust case system than English where arguments are very rarely if ever marked paraphrastically with a PP and instead can be directly assigned their relevant case and accompanying role by the verb.

If we can see how apparent CP arguments fit neatly into our wider system of case and argumenthood, then the traditional claims of DP exclusive arguments look all the more appealing.

Going forwards, these higher level theoretical claims, alongside our system of two paths for CPs and DCPs to compose with verbs, puts us in a position to explore some patterns of argument realisation with CEVs in terms of widely held principles of the Case and Theta-systems.

5.3 Two Strategies to Compose

The previous chapters have shown that, given a predicative semantics for CPs, there are two strategies to compose with a verb.

CPs combined via SATURATE must refer to an individual with propositional content, most plausibly a claim or a fact, that is either already in, or requires to be accommodated into, the common ground. CPs combined via RESTRICT characterise an individual argument of the CEV, without saturating it directly, and without the presupposition that it already exists in the common ground. These two strategies compete and we have already seen that MP! regulates this choice in the cases of presuppositional and non-presuppositional CEVs that have interested us.

The central thesis of Chung (2001), from which our system is chiefly inspired is that this competition of strategies exists in the nominal domain with Maori and Chamorro definites and indefinites.

However there are additional difficulties in extending this system to CP embedding since, as we saw in the previous section, the case and theta system seem tailor made for handling prototypically case bearing and prototypically *e*-type nominal DPs. Understanding this can allow us to see why CPs pop up in what look like apparent argument positions, even where case cannot be assigned. To see how this is borne out we must first look through some fundamental assumptions about argument selection and the thematic hierarchy.

The Thematic Hierarchy

The most basic theoretical underpinning of thematic-role theory is that the realisation of thematic arguments is conditioned by a hierarchy of theta roles. Whilst there are about as many accounts for why this should be as there are Linguists (Dowty, 1991; Marantz, 1984; Chomsky, 1993; Grimshaw, 1990; Reinhart, 2003; Baker, 1997), there is rough agreement on some of the basic elements of the ordering of the system[1]. Some prominent hierachies are given here:

[1]Note we are putting aside the source/path/goal system here which is widely considered to exist on a different dimension.

(1) (Agent(Experiencer(Goal/Source/Location/Beneficiary(Theme)))) (Grimshaw, 1990)

(2) Cause → Experiencer → Goal / Location / Target → Theme (D. M. Pesetsky, 1996)

(3) Agent → Beneficiary → Recipient/Experiencer → Instrument → Theme/Patient → Location (Bresnan & Kanerva, 1989)

We won't worry too deeply about how this hierarchy is implemented here. Whether the theta-grid of a verb is lexically specified on the verb (Grimshaw, 1990), built up through operations on the lexicon (Reinhart, 2003, 2016), or is an abstraction of compatibility with the relevant morphosyntactic structures which are taken to introduce arguments (Parsons, 1990; Marantz, 1997), for our purposes we need some system which generates at least the following ordering:

(4) Agent/Cause → Experiencer → Goal/Source/Location/Beneficiary → Theme

This basic hierarchy, which correlates very well with those typical ones listed above, puts us in a position to give an account of traditionally tricky cases for theories of thematic role assignment, namely experiencer predicates (Reinhart, 2003; D. M. Pesetsky, 1996), and Say verbs with CP 'arguments' (Grimshaw, 2015).

5.4 Case and ECM

We can derive a concrete prediction from this hierarchy in combination with the theory developed in the earlier chapters of this thesis.

Recall we put aside the tricky case of CEVs which cannot embed even a bleached DP, such as '*complain*'. Since we predict that whenever a CP appears embedded by a verb there must be an individual argument which it predicates of, CEVs which do not take DP arguments at all (like *complain*) can only be behaving this way because they cannot assign case. If this is so then we would also expect that no CEV which does not take DP arguments can embed ECM, since ECM require case.

That is we predict that the following will hold for every CEV which is ungrammatical with any DP object.

(5) a. John complained/insisted that he was a man of his word.
b. *John complained/insisted something.
c. *John complained/insisted him to be a man of his word.

A CEV with no DP complement but an ECM complement, that is if (5-c) were grammatical, would be a counterexample to this claim.

Our prediction seems to be borne out for English at least. In the MegaAttitude[2] dataset of 1007 clause embedding predicates with grammaticality judgements (1-7) on a range of frames including 'NP Ved NP', 'NP Ved that S', and 'NP Ved to VP' (in several different configurations of VP), there are only two verbs which appear with higher than 3/7 for both 'NP Ved NP' and 'NP Ved to VP', but lower than 5/7 for 'NP Ved NP'. These are 'phone' and 'gripe', both of which can be confidently discarded manually as demonstrated in the following examples.

(6) a.???John phoned that he would be coming home.
b. #John phoned something.
c. *John phoned her to be at work.

(7) a. John griped that he was sick.
b. *John griped something.
c. *John griped him to be sick.

If any counterexamples to this generalisation exist, I am unaware of them, and I have looked hard. It is hard to programmatically test with current resources and databases, but to the extent that the system developed here is extendable to other languages, and it must be at least partially to the typologically related languages we saw in chapter 4, then I would predict this generalisation to hold up well crosslinguistically. The only clearly predictable exceptions would be those where the system for clausal embedding is radically different from the system that has concerned us here.

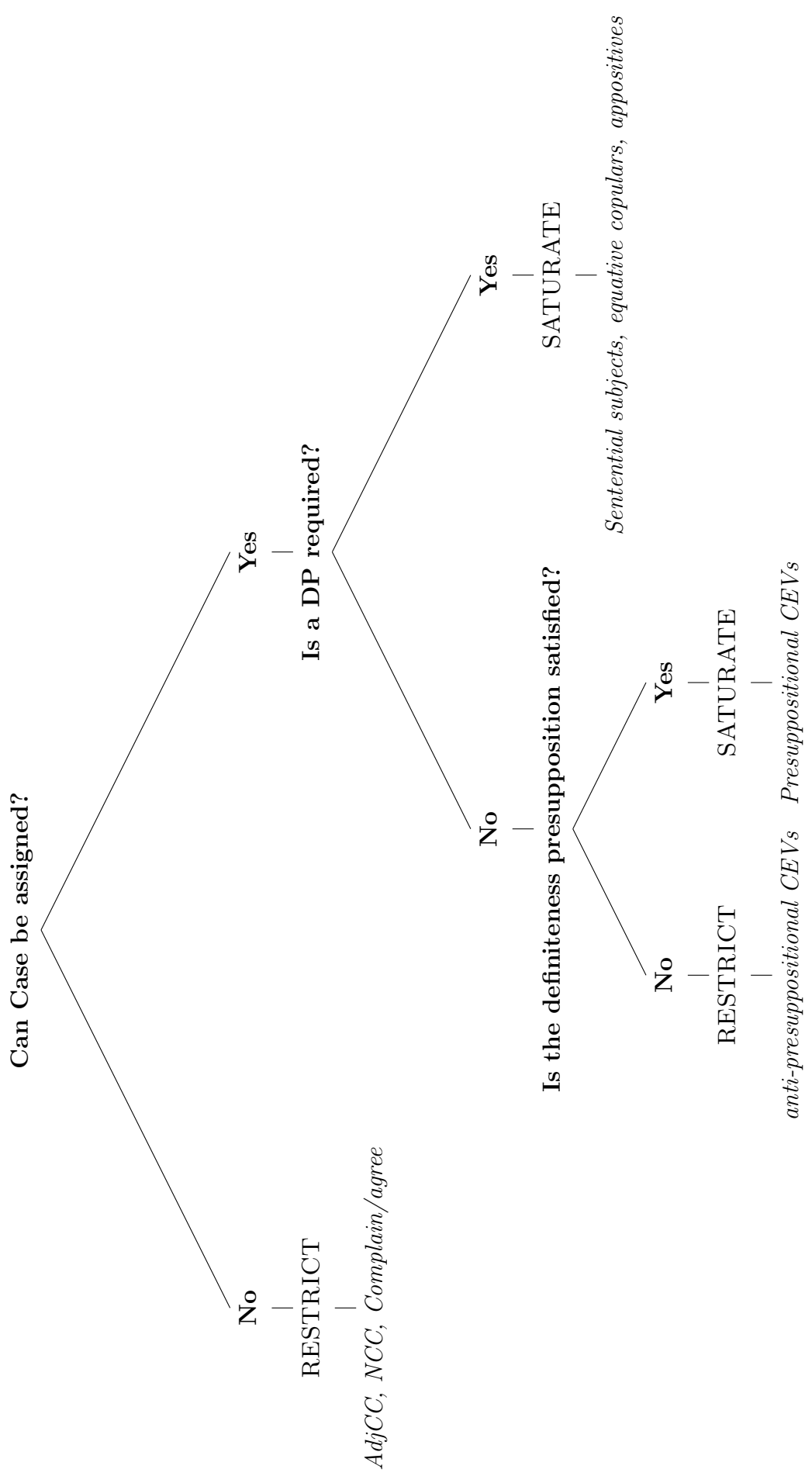
5.5 The Calculus of RESTRICT and SATURATE

The distribution of DCPs vs bare CPs can also be predicted from our assumptions. They have in common that they must appear where semantically licensed, in the case of verbs through their theta-grid, in the case of nouns through being compatible with propositional content. They differ in that DCPs are DPs and therefore require case to be licensed, as per the case filter. Bare CPs do not have this restriction.

Furthermore, since a DCP combining through saturate with a verb will create a *strictly stronger* meaning, both semantically and pragmatically with respect to its presuppositions, if the semantic and syntactic requirements are met then by MP! the CP *must* combine through SATURATE.

The findings are summarised in the following decision tree:

[2]http://megaattitude.io/data/ White and Rawlins


Can Case be assigned?
No
RESTRICT
AdjCC, NCC, Complain/agree
Yes
Is a DP required?
No
Is the definiteness presupposition satisfied?
No
RESTRICT
anti-presuppositional CEVs
Yes
SATURATE
Presuppositional CEVs
Yes
SATURATE
Sentential subjects, equative copulars, appositives

If a CP is semantically licensed but no case can be assigned then a DCP obviously cannot appear, and therefore a CP can only compose by RESTRICT. Examples of this are complements to case assignees, like adjectives and nouns, and as objects of verbs which do not assign case to their object (and so no DP is possible).

(8) I am happy that it is over. [AdjCC]

(9) The rumour that Johan is coming... [NCC]

(10) Tom complained that he hadn't slept well in weeks. [No ACC Case]

When case can be assigned the question becomes whether or not a type e DP is required in order to satisfy some other requirement. For sentential subjects this will be the need to satisfy EPP. For equative copulars and appositions this is the need to satisfy the requirement that the post-copular element be of the same semantic type as the precopular DP[3], or that the two elements in apposition be coreferential.

(11) [.DP That the Earth is round] is true. [Sentential Subject]

(12) The rumour is [.DP that Lisa got the job]. [Equative Copular]

(13) The proof, namely [.DP that there are infinite primes]. [Apposition]

If a DP is not required for some other grammatical reason and case can possibly be assigned, as is the case in the objects of CEVs, then *MP!* has the final say. Presuppositionals are obliged to combine with DCP via SATURATE because of MP!, and anti-presuppositionals are unable to combine via SATURATE because they cannot take their affected object from the common ground, and therefore must combine via RESTRICT.

(14) Godel discovered [.DP that Arithmetic reduces to Logic]. [Presuppositional CEV]

(15) Russel thinks [.CP that Arithmetic reduces to Logic]. [Anti-presuppositional CEV]

We can see here why the rare responsive verbs which do not take ordinary DP complements, i.e. '*agree, concur*', are not counterexamples even though The restrictive strategy does not require TCs to have case, but the saturation (covert Δ) strategy does. *Agree* and *Concur* cannot assign case and so even though MP! would under normal circumstances demand that the object of a presuppositional CEV be realised as a DCP. As we saw in chapter 4, Bondarenko (2021b) suggests that this explains the two readings in certain verbs of saying in Russian.

[3]Heycock (2012)

5.6 Factivity

There is a vast literature on factivity, and the proposals of this thesis do not put us in a position to address all of the traditional puzzles associated with it. However, given our observation that all factives are presuppositional, and thus must combine with CEVs via SATURATE through a DP layer, we are in a position to explain some of the generalisations observed in the literature.

I will briefly note the two most plausible avenues for deriving factivity that are compatible with our approach. Firstly factivity might be derived where the salient object selected in the common ground by $\Delta$is simply a fact. This approach is the same in spirit as that of Kiparsky and Kiparsky (1971), though without the need for a covert noun 'fact', and has been implemented to differing extents by various authors (Hanink & Bochnak, 2017; Kastner, 2015; Moulton, 2017). Secondly we might think that whilst definiteness is necessary condition for factivity, the actual source of factive inferences is generated somewhere higher up, possibly by the interaction of pragmatic and lexical semantic factors. I leave a full exploration of this deep topic to other work, but we should note that either approach is consistent with the system as outlined in this thesis.

These directions are also much more plausible if we are free from having to make the assumption that there are fundamentally two distinct semantic clause types, factives and non-factives, as is suggested in various works (Moffett, 2003; Kratzer, 2006; Ginzburg, 1995). The advantage of our account is we can assign a uniform semantics for TCs, we don't have to use two distinct complementisers or clause types, which is at least prima facie implausible given the crosslinguistic stability of using the same lexical item as both factive and non-factive complementisers.

Regardless of how factivity comes about, our system makes at least two concrete predictions about the behaviour of factives.

If factivity is derived from the presuppositions of a DCP then if a TC appears in a caseless position then it cannot be factive, since it can only have combined via RESTRICT from a CP without a DP layer. The prediction is therefore that there is no verb 'Felieves' which is factive but cannot take a DP complement.

(16) a. John felieves that P.
b. #John felieves that P, but ¬P.
c. *John felieves something.

To my knowledge no '*felieve*' type verb exists.

Several authors have observed a generalisation that there are no communicative factives (Anand & Hacquard, 2014; Anand et al., 2017; White, Hacquard, & Lidz, 2018). We saw in 4.5.2 communicatives will always be anti-presuppositional, since

they create their linguistic material as a token object. This will mean that they cannot be presuppositional, cannot combine with a DCP through SATURATE and so cannot be factive. This generalisation then, which is difficult to explain on existing accounts, falls neatly out of independently motivated assumptions which we have already made.

5.7 Experiencer Predicates

Experiencer predicates, like '*worry*' have been traditionally difficult to understand from existing theories of argument structure, particularly when they interact with apparently clausal arguments (D. M. Pesetsky, 1996; Reinhart, 2003, 2016; Grimshaw, 1990).

A first pass at a theta grid for '*worry*' which would conform to the hierarchy adopted in 5.4 would look as follows:

(17) *Worry* (Cause (Experiencer))

A classic puzzle for understanding the argument structure of such verbs is that experiencers can be realised by either a subject or an object depending on whether the other argument is a DP or a CP.

(18) a. Something worries Mary
b. Mary worries (that the course is too difficult).

We might observe another set of patterns with CP 'arguments'.

(19) a. That the course is too difficult worries Mary.
b. It worries Mary that the course is too difficult.

Note the constrast between structures with two DPs and ones with a single DP and a CP.

(20) a. Something worries Mary.
b. Mary worries something.

(21) a. Mary worries that the course is too difficult.
b. That the course is too difficult worries Mary.

When two DPs are realised the higher one must be the Cause and the lower must be the experiencer. When only one DP is realised, it will be the internal, Experiencer argument, since the Cause argument is introduced by a higher head (and it couldn't be a CP since these are non-mental). The subject requirement must be met, so either

the experiencer DP moves to the subject position, or it is occupied by expletive 'it'. In any case, if a CP is realised it must be the Cause argument. If the Cause is in the common ground, e.g. it has already been discussed that the course is too difficult, then this may be combined as a DCP through saturate. In this case it must be promoted to subject, rather than the experiencer, since it is higher in the theta-grid. If the Cause is new information then it will be realised as a CP and so extrapose to the right, explaining the apparent violation of the theta-hierarchy in next, where an experiencer is realised higher than a cause.

With this account the thematic hierarchy we adopted in 5.4 is maintained, that is DP arguments are always realised according to this hierarchy.

(22) [DP Something] worries [DP Mary].
CAUSE EXPERIENCER

(23) [DP That the course is too difficult] worries [DP Mary]
CAUSE EXPERIENCER

(24) [DP Mary] worries [CP that the course is too difficult]
EXPERIENCER (Predicate of) CAUSE

Here then we can see that without the need for any additional assumptions beyond the fairly standard thematic hierachy we selected, our system derives the correct predictions for the realisations and semantics of DP and clausal arguments.

5.8 Say verbs

Say verbs (Grimshaw, 2015) are argued to all have the same core argument structure but can differ highly idiosyncratically on which cases they can assign. The core argument structure, as expressed in a theta-grid, looks as follows:

(25) *Say* (Agent (Goal (Theme)))

Consistent with what he have claimed throughout this thesis the theme is linguistic material which is created by the event. This is an affected object and so SAY verbs must under this picture be anti-presuppositionals. There is therefore no requirement that they be able to assign case to a Theme argument, since the RESTRICT strategy allows for a CP to be meaningfully composed without needing case to be assigned to an internal argument.

The goal argument characterises who the saying was done towards. *recipient* would be a plausible alternative here, but to keep our hierarchy minimal all that matters is that whatever this role is it appears in between the Agent and the Theme

in our thematic hiearchy

The idiosyncratic options for case assignment can therefore be characterised as follows depending on whether a verb can assign one of, both, or neither of accusative or dative case to a theme or goal respectively. Each options is exemplified with examples to prove their case assignment properties.

Here I use a feature specification where if a verb is marked [+ ACC] then it is capable of assigning Accusative case, not to be confused with another, arguably more common, formalism wherein [+ACC] would mark an item as being marked by accusative case and [−ACC] would mark a verb or preposition as needing to check an accusative case.

[±ACC,±DAT]

5.8.1 Tell [+ACC,+DAT]

(26) a. John told Mary "Elephants and birds are not comparable"
b. John told Mary something.
c. John told Mary that Elephants and birds are not comparable.

teach, promise, tweet, Whatsapp.

5.8.2 Say [+ACC,−DAT]

(27) a. *John said Mary "Elephants and birds are not comparable"
b. John said to Mary "Elephants and birds are not comparable"
c. *John said Mary something.
d. John said something to Mary.
e. John said to Mary that Elephants and birds are not comparable.

say, whisper, announce, propose

5.8.3 Inform [−ACC,+DAT]

(28) a. John instructed Mary "you can't go into that building!"
b. *John instructed Mary something.
c. John instructed Mary on/about/of something.
d. John instructed Mary that she shouldn't go in that building.

inform, convince, bet, wager, remind, persuade

5.8.4 Respond [−ACC,−DAT]

(29) a. *John responded Mary "Elephants and birds are not comparable"

b. John responded "Elephants and birds are not comparable".
c. *John respond Mary something.
d. *John respond something to Mary.
e. John respond to Sarah about his upcoming exam.
f. John responded to Mary that Elephants and birds are not comparable.

pray, insist, exclaim, explain

The generalisation that comes through here is that in cases where accusative case cannot be assigned, as demonstrated by the impossibility of a DP argument here, it is still possible to 'characterise' if not realise the Theme argument with a CP that combines via RESTRICT. Again this generalisation falls naturally out of our assumptions about anti-presuppositionals not requiring case assignment for their CP embedding to occur. Note, also that semantically similar Spanish say verbs can always realise the Goal argument with a clitic, which does not require case, even when the argument cannot be realised by a full DP without the aid of a preposition.

An interesting side note is that the productive class seems to be the Tell[+ACC,+DAT] class, since novel verbs are uniformly adopted into it e.g. *Tweet, email, facebook, whatsapp, wechat*. I do not know why this should be, but it perhaps hints that these case feature grids may not be as idiosyncratic as we previously assumed.

5.9 Conclusion

In this chapter I explored some extensions of the calculus of SATURATE and RESTRICT, which was originally motivated to narrowly account for some puzzles in for two classes of CEVs. I hope it has been made clear how this system, alongside some widely held and independently motivated assumptions in the syntax-semantic interface concerning argument structure, can be revealing with respect to an unexpectedly large range of puzzling behaviour in this domain.

Our system allowed us to make several concrete generalisations which, to my knowledge and with the assistance of the available corpora, are borne out. It also gives a neat account of two traditionally difficult classes of verbs, experiencer and SAY verbs, which falls naturally from the system we proposed.

In particular I would like to highlight how this complex behaviour is generated by the interaction between nominal DP arguments and bare CP modifiers or CPs enclosed in a DP layer. Only by seeing how these two domains of Nominal and Clausal embedding interact in a single system will we be able to give a correct theory of argument realisation.

Chapter 6

Conclusion, Or how to derive a Clausal argument even when you can't

6.1 Introduction

In this final concluding chapter, I'd like to zoom out to some broader implications of the work in this thesis and how it might be applied to other areas of research, in particular broader theories of the grammar of the clausal and nominal systems, and to language evolution. In particular I want to compare the system built up here with alternative strategies to achieve what is achieved by clausal embedding both internal to English and crosslinguistically.

My hope is to indicate some directions in which this work may be developed into a wider framework for understanding the space in which nominal and clausal embedding can operate generalised over all languages. Whilst there is not enough time or space to address every strategy in every language (perhaps in any lifetime), we are in a position to note some trends and generalisations in familiar and well-studied languages.

6.2 Derivation from the nominal system

We saw in chapter 5 how clausal and nominal embedding systems can interact in the domain of argument structure. An interesting, unexplored question though is the extent to which these systems are simply specific cases of one more general embedding system. As we saw in 5.2. theories of case and thematic systems are typically built around DPs, with CPs left to be handled as exceptions. It appears from this theoretical standpoint that language is fundamentally 'designed' with 'DP' argu-

ments in mind. Given the purported advantages in being able to embed full clauses inside eachother in order to express more complex, higher order, ideas (Corballis, 2011; Deutscher, 2000), this poses a challenge for languages to solve.

How then can we embed clauses to behave functionally as arguments to verbs without fundamentally rewriting the existing case and thematic system which works so well for DPs? In this light, with a pressure from communication to evolve the ability to embed clauses, and a working system for nominal DPs which would require radical rewriting to accomodate CPs in the same way (Reinhart, 2003), the seemingly barroque system laid out in this thesis looks much more like the solution to an optimisation problem of these competing pressures.

Once CPs are understood as predicates, as argued in chapter 3, just as NPs are, it seems a natural move to co-opt determiners from the nominal system. The clearest evidence of this is our observation from 4.2. that all overt clausal determiners are also available as apparently the same item as nominal determiners. When this new possibility interacts with the existing system for nominal DP complementation, the result is the complex patterns some of which where outlined and addressed in chapter 5.

All of this is not to suggest that the system present in English and many of the languages with overt determiners discussed in this thesis is inevitable, or the only observed system that solves the problem of clausal embedding .

Languages like Dyirbal (Dixon, Anderson, Huddleston, & others, 1972), Old Akkadian (Deutscher, 2000), and PIE (Kiparsky, 1995) have been shown to lack finite clause embedding. We might see this as evidence that these languages lack some fundamental operation available in other languages, like merge (Everett, 2012), but this phenomenon could be better explained by the fact that finite clauses simply do not make good arguments under a very natural case and theta system for nominals.

Does this mean that Dyirbal, Old Akkadian, and PIE had no solution to the problem of clausal embedding, or that they had no pressure to evolve one? This seems unlikely. In fact we observe a very wide class of strategies for embedding clauses, in which the system described in this thesis is only one example. Given it's plausible prevalence in several typologically distinct languages, suggesting its multiple times, it seems to be a particular natural or good solution. But this does not in any way rule out the possibility of equally viable alternate strategies. In the following section I will outline some such alternate strategies which are attested in English and other languages which do some of the same job as our clause embedding system, though with diffing capabilities. This is not intended as a comprehensive review of these systems, but rather as an indication of the space of strategies in which the one outlined by this thesis exists and as a prompt at directions for future research.

6.3 Alternate Strategies

6.3.1 Nominalisation

The most obvious route to achieving some of the communicative power delivered by full clausal embedding is to go through nominalisation of the verb. We see this with CENs in English (e.g. "the observation of the patient") but similar strategies are common crosslinguistically (Dixon, 2006; Moulton, 2017). Intuitively this is an incredibly natural way to accommodate clause-like structures into an argument system built around DPs and case. As an example, Basque clauses are nominalised crucially by an element which can be assigned case (J. Levin & Massam, 1985; Laka, 2006).

-ing and other nominalisations in English though, have the limitation in English that they are understood as presuppositional (Higginbotham, 2009). It has seperately been observerd that gerunds are not possible as complements to verbs of thinking and saying (Frajzyngier & Jasperson, 1991)[p140], consistent with our claims that these are necessarily antipresuppositional.

This limitation seems to extend to many other languages which make use of nominalised clauses to achieve some form of embedding. Nominalised clauses in Korean and Japanese are not possible with anti-presuppositionals (Han, Kim, Moulton, & Lidz, 2020) and when they combine with non-presuppositional 'believe' it becomes factive. Basque and Washo clauses also are not possible with non-presuppositionals (Hanink & Bochnak, 2017).

It seems that clausal nominalisations, like English deverbal nominalisations are interpreted as referring to an event in the common ground, or with at least some form of definite status. As observed in chapter 4, this makes them incompatible with anti-presuppositionals. This means that at least some alternative is needed in languages with clausal nominalisation in order to communicate the kinds of meanings we might want from anti-presuppositionals.

6.3.2 Parataxis

Main clauses can be placed alongside each other paratactically, and sometimes this can result in something like the meanings of embedded clauses. This is a method available to many, and quite possibly all, languages. It is by far the dominant strategy in the oldest languages we have records of or can reconstruct (Givón, 1979), (Deutscher, 2000). After reviewing some examples of parataxis, we will return briefly to the question of WHY such strategies should be so commonly available, particularly in older languages.

Kiparsky (1995) argues that the English complementiser 'that' developed from a

reanalysis of a paratactic construction used to express precisely this type of meaning, where the second clause is taken to specify the meaning of the demonstrative in the first

(1) a. John said [that]. [The Earth moves].
b. John said [that the Earth moves].

This echoes very clearly Davidson's original analaysis of English clausal embedding as parataxis (Davidson, 1969), though we have already seen reasons to reject this as an analysis of PDE, even if it is a plausible model of the evolution of strategies in PDE.

Parataxis then is a perfectly workable strategy some of the time, but it suffers from the severe drawback of relying on context and world knowledge in order to understand the semantic relation between the elements placed alongside eachother. Consider the following examples.

(2) a. Keep it secret. Keep it safe.
b. Keep it secret $\bigwedge$ Keep it safe.

(3) a. I came. I saw. I conquered.
b. I came $\bigwedge$ I saw $\bigwedge$ I conquered.

Whilst (2) and (3) both indicate a conjunction or two independent clauses, (3) has a temporal component.

(4) a. Maybe she's born with it. Maybe it's Maybelline.
b. Maybe she's born with it $\bigvee$ Maybe it's Maybelline.

(4) on the other hand does not indicate a conjuction at all but a form of disjunction.

(5) a. No blacks. No irish. No dogs.
b. No blacks $\bigwedge$ No irish $\bigwedge$ No dogs.

(6) a. No shoes. No shirt. No entry.
b. (No shoes $\bigvee$ No shirt) $\rightarrow$ No entry.

Whilst (5) and (6) might both be found on the side of a very repugnant bar, and have extremely parallel surface structures, the logical relation between the the three elements is radically different. It can only be derived from world knowledge about what the most plausible logical relation between these elements would be, and not from the grammatical structure, since this is identical.

Nominalisation, and the clausal system described by this thesis do not suffer from this disadvantage.

6.3.3 Prolepsis

Another strategy related to parataxis is clausal prolepsis. Here a clause can be treated as-if it were an argument to a verb by having a proleptic, anticipatory pronoun such as "it" followed by a clause which the pronoun is read to anaphoric for (De Cuba, 2017). This avoids the case theoretic difficulties of fully embedding a clause under a verb, by using a proxy DP. It also appears more hypotactic than the basic paratactic stategy outlined in the previous section, since it incorporates the second clause into the main sentence, even if not directly as the object of the verb. This strategy is possible, though not widely used in English

(7) I believe it that P.

Though like with nominalisation this is only supposed to be possible with presuppositionals.

(8) *I think/say/hope it that P.

(9) I know/discovered it that P.

6.3.4 Slifting

Slifting is a phenomenon where CEVs can appear paranthetically to a main clause.

(10) John is happy, I think.

These clauses may seem to serve the same purpose as their non-slifted counterparts such as (11), however there are several striking contrasts betweeen the meanings of (10) and (11).

(11) I think that John is happy.

The first of these is that slifted clause are main clauses, not subordinate ones (Potts, 2002; Koev, 2021). They cannot appear with a complementiser, in contrast to sentential subjects which *must* have a complementiser.

(12) a. That it was raining hard, they thought.
b. They thought that it was raining hard.
c. That it was raining hard. examples from (Koev, 2021).

When interogatives are slifted there is no subject auxilliary inversion, which is true of main clause interrogatives but not subordinates.

(13) a. Had she made a mistake, he wondered.
b. *He wondered (whether) had she made a mistake.
c. Had she made a mistake?

It seems that since slifted clauses can only be main clauses, and not subordinate ones the slifted clause must be interpretted as at-issue content. They can only be used to introduce something for discussion, not as a way to comment on the epistemic justification for a question under discussion.

Context: A and B hear John shouting about Mary being pregnant.

(14) A: Is Mary pregnant?
B: No no, it's just that **John thinks that Mary is pregnant**.

(15) A: Is Mary pregnant?
B: ???? No no, it's just that **Mary is pregnant, John thinks.**

Slifting then can be a useful way to express notions such as evidentiality, but the main assertion still has to be the slifting clause, limiting its use for in contexts where the CEV is precisely the main point of utterance.

6.3.5 The move from Parataxis to Hypotaxis

The three paratactic strategies introduced above have been suggested by historical linguists to predominate in the earliest languages for which we have records, where full, hypotactic subordination of clauses is barely, if ever, observed.

> Further telling evidence can be gleaned from historical data. The earliest written texts in a language are usually highly paratactic ... while later texts typically show more use of subordination. The historical increase in the frequency of subordination is gradual.

(Dabrowska, 2015)[p230]

> Certain types of languages - those which have only coordination ('clause chaining') but no subordination - are found only in preliterate 'societies of intimates'

(Givón, 1979)[p306]

A common historical hypothesis is that there is a linguistic trend or evolution from reliance on paratactic methods of clause embedding to hypotactic ones, though this thesis is not uncontroversial (Deutscher, 2000; Givón, 1979). The conclusions of this thesis may point tentatively in the direction of an explanation for this reported phenomenon.

A motif we have seen throughout clause embedding strategies is that they appear to ways to hijack the robust system for nominal DP embedding. This may suggest that early languages relied exclusively on this system. With the increased requirement to express more deeply embedded ideas which require descriptions of intentionality only possible by embedding sentences within one another, a an evolutionary linguistic pressure to express these ideas intensified. It seems implausible to suggest that early linguistic humans did not have the capacity to conceive of the relevant embedded intentional ideas, but their language may well have been ill-suited to help them express them (Corballis, 2011; Deutscher, 2000).

Paratactic strategies represent the most accessible, in the sense of requiring the least deep changes to the fundamental grammar in order to help express these ideas. However, given a complex enough human society, where orders, claims, theories and laws are embedded in a deeply layered hierarchical structure, it is no longer enough to rely on easy to access paratactic strategies when the limitations we have raised above become more and more intolerable.

The system of clausal embedding built in this thesis then, which is perhaps representative of many of or at least the most dominant hypotactic strategy, provides a far more robust solution to this problem in that it allows for unambiguous and recursive embedding of clauses. It does this too by being parasitic on the preexisting system of case and thematic role assignment built around nominal DP embedding. However, unlike the easy to access paratactic strategies, this strategy requires the leap of having CPs at some level denote predicates. Whilst it is not perfectly clear how this leap may have occurred in the history of English, there seems to be enough historical evidence to suggest that something like this has occured multiple times accross several language families (Kiparsky, 1995; Dixon, 2005).

Using a complementiser to create a predicate out of a proposition is a powerful, effective and natural strategy. *Powerful* because it allows for recursive embedding of clauses without ambiguity. *Effective* because it allows reference to irrealis or non-factive events or situations without having to commit the speaker to them. And *natural* because it makes efficient of the compositional mechanisms and argument relations that already exist for nominals.

On the one hand we should not be surprised that many typologically distant languages converged on the same solution. The nominal system for arguments is already there and it just takes turning a propositional TP into a predicative CP to get it to play with this system.

On the other hand we should not mistake this for determinism about the development of language. Many languages get by just fine without predicative CPs.

Without a complete historical investigation into this type of innovation in clause embedding strategies, much of this is still extremely speculative. However, I hope

it is useful to see how re-framing systems of clausal embedding in the way suggested by this thesis can give us a potential avenue to explore explanations for the crosslinguistic and historical patterns observed in clause embedding strategies.

6.4 Open Questions

Finally I will address some of open questions in topics clearly adjacent to the concerns of this thesis, but which would require an entirely new thesis to address in the detail they deserve.

6.4.1 Question Embedding

A major modern topic in the study of CEVs is that of question and declarative embedding. We have at best skirted around the side of these issues in this thesis, but one or two adjacent topics are certainly worthy of mention here.

Firstly it has been observed in multiple places that factivity correlates (imperfectly) with question-embedding (Egré, 2008; Uegaki, 2015a; Ginzburg, 1995; Hintikka, 1962; Spector & Egré, 2015; White et al., 2018). Furthermore it has already been noted by Uegaki (2015a) that entailment failures subsume question embedding and factivity. I have not pursued an analysis of these phenomena based on the insights into entailment patterns and factivity raised in this thesis, but there is potential to explore this avenue in order to understand the correlations mentioned above.

Secondly, interrogative clauses share many of the semantic and syntactic complexities with respect to their interaction with the case system that we observe with declarative clauses. In general, in contrast to declarative CPs, they do appear in case positions.

(16) a. The question of why we're here.
b. Think about what the hell you're doing.
c. Whether she'll leave or not is something we're discussing.

But they also appear in some positions where case cannot be assigned, as in the complement to verbs like *inquire* (D. M. Pesetsky, 1996).

(17) They inquired what was going on/*that.

Unlike declarative CPs though they cannot appear as the complement to a noun or adjective.

(18) a. I am happy *(about) what you're doing.

b. *The question why we're here[1].

There is no straightforward way I can see to incorporate these insights into the understanding of the interaction between nominal and clausal complementation systems explored in chapter 5, without a much deeper understanding of the way in which interrogative clauses interact with case.

6.4.2 Philosophical Roles for Propositions

Though philosophical problems have not been our focus in this thesis, much of the literature which first identified empirical linguistic problems for clausal embedding was philosophically motivated. As such it is worth spending some time reflecting on how our picture may speak to some of the philosophical issues which are of primary concern to the instigating literature.

Recall the traditional roles for propositions which we began with and their corresponding linguistic evidence:

(19) a. The meanings of declarative sentences.
b. The semantic value of 'that'-clauses.
c. The objects of certain attitudes.
d. The primary bearers of truth.
e. The bearers of modal properties.

(20) a. 'The Earth is round.'
b. 'The proposition that the Earth is round...'
c. 'I believe that the Earth is round.'
d. 'That the Earth is round is true.'
e. 'It is possible that the Earth is round.'

Given our new analyses of the semantics of the apparent linguistic evidence for these roles all being played by a unique individual. NCCs describe the content of an individual, they don't denote individuals. For example, sentential subjects and objects of so-called propositional attitude reports have been analysed here as in fact individuals with propositional content, not propositions themselves. This makes an analysis like that advanced by Frederike Moltmann, where there are various kinds of modal an attidudinal objects, much more plausible (Moltmann, 2004b, 2013, 2020).

The view that CPs as modifiers of content bearing individuals does also have some affinity with approaches which understand propositions as denoting properties (Speaks, 2014), or types of utterances/mental acts (Hanks, 2015; Soames, 2014).

Though before we attempt to reach any wide ranging conclusions about the

[1]With the right intonation this can be understood as an apposition

metaphysics of our language, there is also something of a cautionary tale for trying to read our metaphysics off of the apparent surface structure of language. The Old Babylonian and Dyiribal Philosophy departments would likely never have found a Fregean account of Propositional attitude reports very plausible, since their verbs don't even look like they apparently embed TPs. And they would be much better for not having been mislead by their language in this way.

6.5 Final Thoughts

To resummarise, the central claims of this these have been:

(21) The arguments of clause embedding verbs (CEVs) are exclusively individuals of type e, and not as has been standardly assumed, propositions [Chapters 2 and 5]

(22) The semantic type of CPs is that of a predicate, that is (the characteristic function of) a set of individuals $\langle e, t\rangle$ [Chapter 3]

(23) Apparent CPs which appear in certain syntactic configurations, as sentential subjects or the objects of presuppositional CEVs are in fact DPs headed by a covert definite determiner Δ. This distinction is syntactically testable and maps onto a corresponding semantic distinction in how these DCPs compose with their embedding verb. [Chapter 4]

(24) The realisation and interpretation of CP arguments can be predicted and explained by incorporating these conclusions into the wider system of nominal argument realisation based on Case and Theta theoretic considerations. [Chapters 4 and 5]

The original contributions here are firstly in synthesising two strains of research, one which identifies clauses as modifiers of nominal arguments and the other which explains the behaviour of DP-like properties of some clauses by positing a covert determiner which creates from them a DP. The analysis of the RESTRICT pathway is heavily adapted from existing proposals, in particular that of Kratzer (2006), but the application of this analysis to the empirical problems introduced in chapter 1 is novel. Whilst the suggestion that certain CPs are enclosed in DP shells is far from novel, a semantic analysis in the style of what is given here has been suggested by Hanink and Bochnak (2017) but has not been pursued in detail for English DCPs.

Beyond this synthesis a key original contribution of this thesis is in showing how this synthesised system of the syntax and semantics of clausal embedding can be integrated with a system of nominal embedding, interacting with case and argu-

menthood, and obeying principles already well established in the nominal domain such as MP! and the thematic role hierarchy.

The suggestions made for future work on related topics such as Factivity, Question embedding, and much more general space of clausal embedding strategies from chapters 5 and 6 will hopefully provide fruitful foundations for future work on these topics, whether undertaken by myself or by others.

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