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## Variables in Natural Language

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VARIABLES IN NATURAL LANGUAGE

A Dissertation Presented

by

MEREDITH LIZABETH LANDMAN

Submitted to the Graduate School of the  
University of Massachusetts Amherst in partial fulfillment  
of the requirements for the degree of

DOCTOR OF PHILOSOPHY

February 2006

Department of Linguistics

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MEREDITH LIZABETH LANDMAN

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ABSTRACT

VARIABLES IN NATURAL LANGUAGE

FEBRUARY 2006

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A central goal of generative linguistics is to determine what constitutes a *possible* grammar of a natural language. This thesis works toward that goal in positing a constraint on the possible semantic types of variables in natural language. Specifically, I argue here that the logical forms (LFs) of natural languages do not contain *higher-type* variables, i.e., variables of a type higher than that of an individual, type *e* (see Chierchia (1984) and Baker (2003) for similar proposals). I refer to this constraint as the *No Higher-Type Variables* constraint (NHTV).

Assuming that the domain of individuals, *D*, includes at least *objects*, *kinds*, *events*, *event-kinds*, *degrees*, *situations*, *worlds*, *times*, and *locations*, all of which have been independently argued to be necessary members of *D*, what NHTV predicts *not* to occur are object language expressions that vary over, e.g., generalized quantifiers, relations, or properties. While NHTV thus predicts a very restricted inventory of variable denoting expressions, I argue that it accounts for a surprisingly wide range of data in characterizing which variable-denoting expressions do and do *not* occur.

I motivate NHTV based primarily on data from English, and to a lesser extent, German and Polish. I focus empirically on two types of expressions that are commonly analyzed as involving variables: (i) (overt) pro-forms, and (ii) *A'-movement* gaps. In particular, I look closely at pro-forms and gaps that have the syntactic distribution of items that are commonly taken to be of a higher-type, namely, APs, AdvPs, VPs, and NPs. While all of these expressions are commonly taken to denote properties of individuals, I argue that pro-forms and gaps that have the distribution of these categories should not be analyzed as property variables, but instead either (i) vary over individuals, or (ii) do not involve variables at all.

The bulk of the thesis is devoted to backing up NHTV by (i) showing that hypothetical higher-type variables are systematically missing, and (ii) looking closely at potential counterexamples on a case-by-case basis.

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## CHAPTER 1

### POSSIBLE VARIABLES

#### 1.1 Introduction

A central goal of generative linguistics is to determine what constitutes a *possible* grammar of a natural language. This thesis works toward that goal in positing a constraint on the possible semantic types of variables in natural language. Specifically, I will argue here that the logical forms (LFs) of natural languages do not contain *higher-type* variables, i.e., variables of a type higher than that of an individual, type  $e$ , so that the following constraint holds (see Chierchia (1984) and Baker (2003) for similar proposals, as discussed in Section 2 below):

- (1) *The No Higher-Type Variables Constraint (NHTV)*

Variables in the LFs of natural languages are of type  $e$ .

I will motivate NHTV based primarily on data from English, and to a lesser extent German and Polish. I consider it a potential semantic universal, but careful investigation of unrelated languages will be necessary to test whether it holds cross-linguistically.

To make clear the predictions of NHTV, it is first necessary to make clear both (i) my assumptions about what counts as an individual, and (ii) what it means to be a variable in the syntactic representation, that is, how variables are represented and interpreted

at LF.<sup>1</sup> Regarding (i), I take the domain of individuals,  $D_e$  (henceforth,  $D$ ) to include at least *objects, kinds, events, event-kinds, degrees, situations, worlds, times* and *locations*, all of which have been independently argued to be necessary members of  $D$  (for arguments for construing kinds as individuals, see Carlson 1977b and references therein; for analyses that assume an ontology that includes degrees, see Klein 1980, 1991, von Stechow 1984, Heim 1985 among others, based on Cresswell 1976; for events, see Davidson 1967 and others; on event-kinds, see Barwise and Perry 1983, Chierchia 1984, Hinrichs 1985, Landman and Morzycki 2003; on situations as individuals, see Kratzer 1989; on worlds, see Cresswell 1990 and Percus 2000). Thus, what NHTV predicts *not* to occur are object language expressions that vary over, e.g., generalized quantifiers, relations, or properties. With respect to properties, this prediction is complicated by the possibility that certain properties correspond to individuals (Chierchia 1984, Chierchia and Turner 1988); I address this issue in Section 1.2.1 below.

Regarding (ii), I take object language variables to be those LF objects that receive their denotation solely from an assignment function. More precisely, I assume here a framework in which a variable is syntactically represented as (associated with) an index that receives its semantic value from an assignment function.<sup>2</sup> Take, for example, the personal pronoun *he*, which may be analyzed as a variable as in (2); here, it is associated

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<sup>1</sup>I will use the phrases “in the syntactic representation”, “at LF”, and “in the object language” interchangeably here.

<sup>2</sup>It is an interesting issue how and if this constraint might be formulated in a variable-free semantics (Quine 1960, Cresswell 1990, Jacobson 2002, 2000, 1999). I postpone discussion of this issue to Chapter 4.

syntactically with the index  $i$ , and receives its denotation from the variable assignment  $g$ , with  $g$  mapping  $i$  to some particular individual in  $D$ .<sup>3</sup>

$$(2) \quad \|he_i\|^g = g(i)$$

In the case of  $he$ , the variable intuitively varies over individuals; I will, however, incorporate NHTV into the semantic component so that all variables range over individuals. That is, I will implement NHTV as a restriction on the variable assignment, by restricting its range to individuals in  $D$ , as in (3).

$$(3) \quad \text{A variable assignment is a partial function from } \mathbb{N} \text{ into } D.$$

In effect, object language variables necessarily denote in  $D$ .

Having made clear my assumptions about both (i) what counts as an individual, and (ii) how variables are represented and interpreted at LF, I turn now to the empirical motivation for NHTV, which is the main topic of this thesis. Before looking at the particular phenomena I will focus on here, however, it will be useful to first reflect on the question of *how it is we know whether a variable occurs in the syntactic representation*. In addressing this issue, I aim to clarify both my reasons for focusing on the particular data I will look at here, as well as my position towards a certain set of potential counterexamples to NHTV that I will not be looking at in detail, but do not see as fatal for my constraint.

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<sup>3</sup> I abstract away here from further information about the PHI features of a pronoun, e.g., masculine gender on  $he$  has been proposed to contribute a presupposition that the value of the variable be male.

Arguably, a key point in motivating the presence of a variable in the object language is to show that the alleged variable has *bound* instances. Consider, for instance, the debate from the 1970s over whether natural language needs the full expressive power of quantification over times, which I will briefly summarize here (see Massey 1969, Kamp 1971, Vlach 1973, Partee 1973, Parsons 1973, Stalnaker 1973, van Benthem 1977, Saarinen 1979, and especially Cresswell 1990 and Kusumoto 1999). In Priorian tense logic, it had been assumed that a single tense index  $t$  was provided as a parameter on the interpretation function (Prior 1967). Tense operators, making reference to  $t$ , were then responsible for the interpretation of sentences with tense information such as past or future. Work by Kamp (1971) and Vlach (1973), however, showed that natural languages can keep track of time points different from  $t$ , and a second parameter on the interpretation function was proposed to store intermediate times. Building on Kamp and Vlach's work, it was then shown that in principle an indefinite number of indices would be needed to account for the expressive power of natural language (Gabbay 1974; Saarinen 1979; Cresswell 1990); this in turn was shown to be equivalent in expressive power to explicit quantification over times in the object language (Cresswell 1990).<sup>4</sup> Importantly, it was the *bound uses* of these variables that was most telling about their status in the object language.

To determine whether a variable occurs in the syntactic representation, then, a first point is to determine whether the alleged variable has bound instances. The fact alone that an expression shows some context dependency is not a sufficient reason for positing a variable: If the expression appears to just have an indexical use, that is, if we

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<sup>4</sup> The same argument can be made for worlds (Cresswell 1990), and possibly situations (Kratzer 2004).

do not find bound instances of that expression, it is entirely possible to represent this information via a separate parameter on the assignment function. A second point is to show that apparent bound uses are not due to bound situation arguments (as Kratzer 2004 points out). To illustrate this latter point, consider the use of higher-type variables to account for contextual restrictions on quantifier domains (Westerstahl 1984, von Fintel 1994, Stanley and Szabo 2000, Stanley 2002, Martí 2003). Quantifiers are context dependent in that the interpretation of a sentence in which in they occur varies depending on the context in which they are uttered. For example, consider an utterance of (4) in the context of a family at the dinner table (based on an example from von Fintel 1998):

(4) Everyone is so quiet.

Under a natural reading of this sentence, the universal quantifier does not quantify over all individuals in the world, but rather is taken to quantify over all individuals at the table; that is, the domain of quantification appears to be contextually restricted. This narrowing of the domain of quantification has been accounted for by positing a higher-type variable in the syntactic representation, which effects a restriction on the domain of the quantifier (there are several proposals for how to implement this idea, see references above). We may ask, then: Do these variables show bound instances? There are indeed examples in which these variables appear to co-vary with a higher quantifier (von Fintel 1994, Heim 1991), as (5) illustrates (from Kratzer 2004):

(5) Every girl finished every task (she was supposed to do.)

In (5), the universal quantifier in the second DP, *every task*, seems to quantify over the set of tasks specific to each girl. This thus appears to be a bound use of the domain restriction variable on the second quantifier. However, as Kratzer (2004) points out, these readings can be accounted for by a bound variable reading of an independently motivated – and syntactically represented – situation variable (the reader is referred to that work for further specifics of that account). Kratzer in addition presents some independent problems for the higher-type variable approach to domain restrictions, questioning, for instance, why these variables are covert across languages.<sup>5</sup> I will not look further at the use of covert higher-type variables to account for context dependencies, but hope to have made clear that it is a challenge for such accounts to show that the alleged variables have bound instances, and that these instances cannot be accounted for by bound situation variables, which are independently motivated. I thus do not see them as necessarily presenting counterexamples to my claim.

I turn now to the cases I will focus on in this thesis. In search of higher-type variables, I will look at two types of expressions that are commonly analyzed as involving variables: (i) (overt) pro-forms, and (ii) movement gaps. In particular, I will look for pro-forms and gaps that have the syntactic distribution of items that are commonly taken to be of a higher-type.<sup>6</sup> Consider, for instance, the following candidate higher-type pro-forms in English, which have the distribution of adjectival phrases (APs), adverbial

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<sup>5</sup> See also Carlson and Storto, to appear, who question the use of these higher-type variables to account for contextual dependencies, but propose a very different alternative account of the same phenomena.

<sup>6</sup> This is, at least, my starting strategy in searching for higher-type variables. However, as will become clear in looking at specific phenomena below, surface pro-forms and traces are not always in a one-to-one correspondence with variables at LF. For example, the surface trace of a pied-piped constituent may at LF contain more semantic material than just a variable; the surface trace then at LF may be of a higher-type, while the variable it contains is just an individual. I will discuss this issue explicitly when it arises below.

phrases (AdvPs), verb phrases (VPs), and noun phrases (NPs, assuming the DP hypothesis), respectively:<sup>7</sup>

- (6) Those little<sub>i</sub> cars look good, but few such<sub>i</sub> cars are safe. *AP*
- (7) You have to dance this dance with a definite sense of pride and haughtiness<sub>i</sub>, and if danced so<sub>i</sub>/thus<sub>i</sub>, the dance will be beautiful.<sup>8</sup> *AdvP*
- (8) Whenever Sophie starts laughing<sub>i</sub>, Bill does so<sub>i</sub> too. *VP*
- (9) I thought she would be happy<sub>i</sub>, but she certainly doesn't seem so<sub>i</sub>. *AP*
- (10) I'll wash the big dishes<sub>i</sub>, if you'll wash the little ones<sub>i</sub>. *NP*

While each of these expressions (the latter underlined expression in each of the above) has the syntactic distribution of a higher-type expression, I will argue that a close look at their semantics shows that they do not behave like property-variables. Rather, they fall into two types: they either (i) vary over individuals, or (ii) do not involve variables at all.<sup>9</sup>

The cases in (6)-(9) – *such*, *thus*, *do so*, and *so* – are instances of the first type: Each of these expressions, I will argue, is associated at LF with a variable that ranges

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<sup>7</sup> I set aside for the immediate discussion instances of VP and NP ellipsis, for example, alongside (8) and (10) are (i) and (ii) below (I use  $\emptyset$  to represent ellipsis):

- (i) Whenever Sophie starts laughing<sub>i</sub>, Bill does  $\emptyset$ <sub>i</sub> too. *VP*
- (ii) I'll wash these dishes<sub>i</sub>, if you'll wash those  $\emptyset$ <sub>i</sub>. *NP*

I will address this issue directly in Chapter 3, where I will argue (as others have) that at least these cases of ellipsis are not interpreted as higher-type variables, but rather are represented at LF as having fully articulated internal syntactic structure.

<sup>8</sup> From: <http://www.cluich.net/HDsolowomen.htm>.

<sup>9</sup> In the case of *one(s)*-anaphora, I will not have a strong case *against* a property-variable, but will only be able to show that a property-variable analysis is not necessary. Thus, at its weakest, my claim will be that there are no natural language expressions that *necessitate* the use of higher-type variables in the object language.

over individuals. More specifically, building on Carlson (1977b), I will argue that *such* varies over individuals that are either *kinds* or individuals that instantiate *kinds*. *Such* thus does not vary over properties, as Siegel (1994) proposes. I will show that treating *such* in this way accounts for its behavior with respect to its complement clauses and ellipsis. Further, this account of *such* explains its parallel behavior with its colloquial paraphrase, *like that*, as well as its similarities with degree morphemes such as *that* and *–so* as used, in e.g., *that tall* or *so tall*. In the spirit of Landman and Morzycki (2003), I will then extend this analysis of *such* to *thus* (7), *do so* (8), and *so* (9), arguing that these too do not vary over properties, but instead vary over individuals that either are kinds or instantiate kinds.

The case in (10), so-called *one(s)*-anaphora (Ross 1967, Stockwell, Schachter and Partee 1973, Jackendoff 1977, Hornstein and Lightfoot 1981, among others), I will treat as an instance of the second type: following Llobart-Huesca (2002), I will analyze *one(s)*-anaphora as an instance of NP Ellipsis.<sup>10</sup> Further, I will follow those researchers that have argued that at least this case of ellipsis is syntactically articulated at LF, and thus not interpreted as a higher-type variable (see Chapter 3 for references and detailed discussion of ellipsis.)

NHTV also predicts a restricted typology of movement constructions that at LF produce variable-binding structures (i.e., those that necessarily involve variables).<sup>11</sup> I will argue that if we look at the kinds of variables that may be abstracted over at LF, the same

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<sup>10</sup> Alternatively, it may be the case that *one(s)*-anaphora is purely indexical, as it does not appear to have bound instances. See Section 3.3 for discussion of this point.

<sup>11</sup> Again, I will briefly discuss variable-free frameworks, which do not posit binding of variables as a product of movement, in Chapter 4.

restrictions seem to hold as were observed for pro-forms. Consider, for example, the types of *wh*-movement possible in English. I assume that these phenomena are represented by structures in which a *wh*-phrase moves to the Specifier of CP, and binds a variable in the *trace* position, as illustrated in (11a-b): (11a) is a *wh*-question, and (11b) a restrictive relative clause, and both can be taken to involve abstraction over an individual in the position corresponding to the displaced DP.<sup>12</sup>

- (11) a. What<sub>*i*</sub> did Mary make *t<sub>*i*</sub>*?  
b. I liked the movie [<sub>CP</sub> *wh<sub>*i*</sub>* that Mary made *t<sub>*i*</sub>*].

Neither of these constructions (*wh*-questions nor restrictive clauses), I will argue, ever create structures in which there is abstraction over higher-type variables. For instance, there is no *wh*-word in English that has the distribution of a VP, as (12a) shows.<sup>13</sup> Instead, to form *wh*-questions for VPs, what appears to be a nominal *wh*-phrase combines with main verb *do* (Ross 1972), as (12b) shows. Similarly, restrictive clauses with VP gaps do not occur, as (12c) shows (see Chapter 4 for a more detailed discussion of what such clauses might mean, if they were possible, and where syntactically we might expect them to occur; and see also Baker (2003) for similar examples, as discussed in Section 1.2.2.2 below):

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<sup>12</sup> As mentioned above, for the cases of reconstruction (or pied-piping), the variable posited at LF will not directly correspond to the surface gap.

<sup>13</sup> I will make similar arguments for APs in Chapter 4.

- (12) a. \*What<sub>i</sub> did you make Mary t<sub>i</sub>? (Cf. I made Mary [VP type].)  
 b. What<sub>i</sub> did you make Mary do t<sub>i</sub>?  
 c. \*I made Mary type [CP wh<sub>i</sub> that you made her t<sub>i</sub>].

The absence of *wh*-questions and restrictive clauses with VP gaps is expected given NHTV, since these constructions would require abstraction over VP meanings, usually taken to be properties of individuals. Note that the ungrammaticality of (12a) is not obviously due to an alternative restriction that only syntactically *nominal* expressions may *wh*-move, as the *wh*-words *where*, *when*, and *how* in the *wh*-questions in (13) and restrictive clauses in (14) are not obviously nominal, and yet are well-formed:

- (13) a. Where<sub>i</sub> did you put the keys t<sub>i</sub>?  
 b. When<sub>i</sub> did you arrive t<sub>i</sub>?  
 c. How<sub>i</sub> did you travel t<sub>i</sub>?
- (14) a. Matthew works [CP where<sub>i</sub> you work t<sub>i</sub>].  
 b. Matthew laughs [CP when<sub>i</sub> you laugh t<sub>i</sub>].  
 c. Matthew sings [CP how<sub>i</sub> you sing t<sub>i</sub>].

I will argue in Chapter 4 that *wh*-movement of these particular adverbials is possible because they produce structures in which there is abstraction over individuals: locations in

(13a) and (14a), times in (13b) and (14b), and event-kinds (following Landman and Morzycki 2003) in (13c) and (14c).<sup>14</sup>

Further, there *are* structures in which VPs do appear to move, as the following fronting (or topicalization) structure illustrates:

(15) ... and [<sub>VP</sub> won the election], Mary did \_\_\_.

However, in just these fronting structures (as well as certain other movement structures, as discussed in Chapter 4), these phrases have been argued to *syntactically* occupy their unmoved position at LF, that is, they have been argued to syntactically *reconstruct*, based on their behavior with respect to Principle C (Cinque 1984; Barss 1986, 1988; Huang 1993; Lebeaux 1990, Heycock 1995, Frampton 1999; Romero 1990, Fox 1999, among others). I will review the arguments for syntactic reconstruction for these cases in Chapter 4, but note here that obligatory syntactic reconstruction for higher-type phrases would be expected if higher-type variables were disallowed at LF (as proposed in slightly different terms in Heycock 1995; see also Fox 1999, p. 171, fn. 41 with respect to *how* many-questions, as well as Beck 1996). In this context, I will also review in Chapter 4 an alternative account of reconstruction that uses higher-type variables to interpret a moved higher-type constituent in its base position, i.e., *semantic reconstruction* (Rullman 1995,

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<sup>14</sup> I will look at non-restrictive relatives (Sells 1985, Potts 2002a, 2002b) and *as*-parenteticals (Potts 2002a, 2002b), which both permit both AP and VP gaps, as (i) and (ii) below illustrate, in Chapter 4.

- (i) a. She was fond of her boy, which Theobald never was \_\_\_. (Sells 1985)  
b. I can make words, which you cannot \_\_.
- (ii) a. Ali was energized, as his trainer suggested he might be \_\_\_. (Potts 2002a,b)  
b. She could see the finish line, as Joan could \_\_ too.

Cresti 1995, von Stechow 1991, among others), and more generally review the arguments for favoring syntactic reconstruction over semantic reconstruction.

To sum up, this thesis posits a constraint on the possible semantic types of variables in the LFs of natural languages, in the form of NHTV. The bulk of the thesis will be devoted to backing up this claim by (i) showing that hypothetical higher-type variables are systematically missing, and (ii) looking closely at potential counterexamples on a case-by-case basis.

The remainder of this thesis is organized as follows. In Section 1.2, I review two precedents to NHTV, namely, Chierchia (1984) and Baker (2003). In Section 1.3, I spell out my basic theoretical assumptions for this thesis. Section 1.4 summarizes the chapter.

In Chapter 2, I look closely at the syntax and semantics of a set of pro-forms that have the syntactic distribution of modifiers, in particular, APs and AdvPs. I start with an analysis of *such* as varying over individuals, following Carlson (1977b) (Section 2.2), and extend this analysis to analogous adverbial pro-forms, following Landman and Morzycki (2003) for German *so* and Polish *tak*, as well as to adnominal and adverbial *like that* in English (Sections 2.3 and 2.4). I then suggest similar analyses of predicative *so* (Section 2.5) and the VP pro-form, *do so* (Section 2.6). Section 2.7 concludes the chapter.

In Chapter 3, I turn to VP and NP Ellipsis, reviewing the arguments against (and for) treating these cases as involving higher-type variables (Sections 3.2 and 3.3). I also, following Llombart-Huesca (2002), review and present some arguments for treating *one(s)*-anaphora as an instance of ellipsis (Section 3.4), and briefly review the *e*-type analysis of pronouns as involving deletion (as proposed in Elbourne 2002) (Section 3.5). Section 3.6 concludes the chapter.

Finally, in Chapter 4, I support my claim that movement does not produce structures in which there is abstraction over higher-type, and that this restricts the types of movement constructions possible in English. I start by reviewing work on reconstruction (Section 4.1), to make clear what exactly is abstracted over at LF. I then look closely at the types of variables that may occur in *wh*-constructions (Section 4.2). Section 4.3 concludes the chapter and the thesis.

## 1.2 Precedents

Both Chierchia (1984) and Baker (2003) propose constraints similar to NHTV. In the following sections, I will present the main points of each, and try to make clear the ways in which their proposals differ from my own.

### 1.2.1 Property Theory and the ‘*No Functor Anaphora*’ Constraint

The constraint proposed here, NHTV, can be viewed as a stricter version of the ‘*no functor anaphora*’ constraint of Chierchia (1984). Chierchia’s constraint follows from the logic of the interpretive system he develops, which permits only variables ranging over individuals (type  $e$ ) and predicates (type  $\langle e, t \rangle$ ). This has consequences for what variable-denoting expressions are possible in a grammar, as Chierchia points out in the following:

Saying that there are no variables of a certain logical type amounts to saying that we cannot refer to arbitrary entities of that type. On the assumption that anaphoric processes involve a capacity to refer to arbitrary entities in a given domain (formally represented by a notation with variables ranging over that domain) our system predicts that functors do not enter anaphoric processes in natural languages. Hence, we should expect that processes such as pronominalization, VP-deletion, *wh*-movement etc. never involve determiners, prepositions, adverbials, etc. It seems to me that there is something basically right about this generalization. For instance, in general determiners, prepositions, complementizers,

etc. do not undergo *wh*-movement and have no pro-forms. Similarly there is no analogue of VP-deletion or *one*-anaphora for these items. [Chierchia 1984: pp. 83-84]

The main difference between Chierchia's constraint and the one I am proposing here is that his allows for variables of type  $\langle e, t \rangle$ , while mine does not. How, then, might the two constraints differ in their empirical predictions? There are some difficulties in trying to answer this. In particular, in some interpretation systems (including Chierchia's) certain properties correspond systematically to individuals (see the *property theory* of Chierchia 1984, Chierchia and Turner 1986; see also Cresswell 1973). Under such a system, it could be hard to tell whether a given occurrence of an expression denotes a property or its individual correlate, and accordingly, whether a given occurrence of a variable denotes a property or its individual correlate. However, given that certain properties do *not* correspond to individuals, one way of comparing the predictions of the two constraints is to try to test whether just those properties that do not correspond to individuals may bind or co-refer with variable-denoting expressions. I will present two cases as arguments that these properties may *not* in fact bind variables. To spell this out more precisely, let me at this point review in more detail the basics of Chierchia's system.

In Chierchia's system, properties may be systematically mapped to their individual correlates via a nominalization function, namely, the 'down' operator,  $\hat{\cdot}$ . Individuals may likewise be mapped to their corresponding properties via the inverse, predicator function: the 'up' operator,  $\hat{\cdot}^{-1}$ . The 'down' operator *nominalizes*, while the 'up' operator *predicativizes*.<sup>15</sup> Thus, in this type of system, properties can be looked at from two different points of view:

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<sup>15</sup> I postpone the formal definition of these operators that I will adopt here until Section 3.2.2 below.

*Qua* predicable entities, they appear to be essentially incomplete or “unsaturated” structures. Something like *runs* cannot stand by itself: it is a structure with a gap in it... So properties as predicables should be conceived as intrinsically incomplete, “gapped”, or “functional” structures... Properties, however can be “nominalized” and nominalized predicative expressions can be subjects in predication acts. This strongly suggests that the unsaturated structures associated with predicative expressions can somehow be “projected” as individuals, or have individual counterparts, which is what nominalized predicative expressions refer to. So on this view, properties have two modes of being: one as “intrinsically functional” entities, the other as individuals systematically correlated to those entities. [Chierchia 1984, pp. 54-55]

Take, for example, the property *be nice*. Used as a predicate, it can be taken to be of type  $\langle e, t \rangle$ , mapping an individual to a truth value:

(16) John is nice.

Used as a subject, however – a gerund, for example – it may be taken to refer to an (abstract) individual, the nominalization of *be nice*, so that itself may be predicated of an  $\langle e, t \rangle$  type predicate:

(17) Being nice is nice. (Chierchia 1984)

The system offers an elegant account of nominalization, as it makes possible a uniform treatment of predication: subjects are (generally) individuals, and predicates are (generally) properties. Further, this view of nominalization explains why certain expressions may not occur as subjects, e.g., *I'*, as in (18); if *I'* necessarily denotes a property, and not an individual, the ill-formedness of this example follows.

(18) \**Is nice* is nice. (Chierchia 1984)

Returning to the issue at hand (i.e., whether properties that do not correspond to individuals may bind variables), a first example comes from I'. If an I' necessarily corresponds to a property, as (18) suggests, it then follows from NHTV that it should also have no corresponding pro-form, which appears to be the case, as (19) shows (I use *that* to represent a hypothetical, but non occurring pro-form):<sup>16</sup>

(19) \*John is being nice<sub>i</sub>, and Mary that<sub>i</sub> too.

This, however, is admittedly not a very strong argument, since independent factors may certainly rule out pro-forms like the hypothetical *that* in (19). Further, I's certainly may be unpronounced in many languages (e.g., English *John is being nice, and Mary too*), and these cases might be analyzed as variables, depending on whether or not there is evidence for treating them as cases of ellipsis. It would be interesting, though, to see whether any language uses overt pro-forms for I'.

A second, and stronger example of a class of properties that do not correspond to individuals, nor bind variables, comes from the nominal domain: Carlson (1977b) observes that certain properties do not seem to have individual correlates, that is, they do not seem to correspond to *kinds*. The bare plurals in (20) are a case in point:

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<sup>16</sup> This is admittedly not a very strong argument, since independent factors may certainly rule out pro-forms like the hypothetical *na* in (19). Further, I's certainly may be unpronounced in many languages (e.g., English *John is being nice, and Mary too*), and these cases might be analyzed as variables, depending on whether or not there is evidence for treating them as cases of ellipsis. It would be interesting to see whether any language uses overt pro-forms for I'.

- (20) a. parts of that machine (Carlson 1977b)  
b. people in the next room  
c. books that John lost yesterday  
d. bears that are eating (now)

These properties pick out classes of objects that “refer to a finite set of things... that must exist at a certain time in a given world.” Like I’s, they seem not to be in the domain of nominalization function,  $\hat{\cdot}$ . As Carlson observes, exactly these properties may not antecede the pro-form *such*, a putative property-anaphor (see Chapter 2 for a more detailed discussion of *such*):

- (21) *People in the next room... ??such people (are obnoxious)* (Carlson 1977b)

Thus, it appears that the antecedents for *such* form the natural class of properties that have individual correlates. This falls out naturally from NHTV, and we would not expect the opposite state of affairs to hold, that is, to find a pro-form that could only be anteceded by properties that do not correspond to kinds/individuals. Again, a constraint like Chierchia’s, which allows for property variables, would not rule out such pro-forms.

A second strategy for teasing apart the predictions of the two constraints, as stated in the introduction, is to try to identify syntactic positions that must be occupied by property-denoting expressions (but not their individual correlates), and to check whether pro-forms or gaps may occupy those positions. I will note, here, however, that it is a problem for this strategy that even if a particular syntactic node can be assumed to require a prop-

erty-denoting interpretation, there might still be a syntactic layer below that node which is individual-denoting, and sister to some covert functional structure which maps individuals to their corresponding predicates. For example, Kratzer (2005), following Krifka (1995) and Yang (1991) (and, originally, Carlson (1977b)), assumes that noun roots, stripped of their inflectional morphology, are kind-denoting. She further proposes, in the spirit of Krifka (1995) and Borer (2005), that English has an ambiguous, non-overt classifier, which may map a kind-denoting noun root into a property of individuals that realize that kind, as illustrated in (22):

(22) [<sub>NP</sub> classifier [<sub>N</sub> zebra]]

Thus, “predicative count nouns are syntactically constructed from names of kinds with the help of classifiers” (Kratzer 2005, p. 7). This is relevant here, because even if NPs can be assumed to be property-denoting, a pro-form or trace with the syntactic distribution of an NP might itself not necessarily be property-denoting; the pro-form or trace might be individual-denoting, occupying some lower position in an NP, which is mapped to a predicate by a covert classifier. With such possibilities for covert functional structure, it is difficult to determine whether a pro-form is at heart individual-denoting or property-denoting. I have no good solution for this difficulty at this time, except to keep it in mind when looking at pro-forms or gaps that have the distribution of higher-type constituents.

In sum, NHTV may be seen as a stricter version of Chierchia’s ‘no functor anaphora’ constraint, as the latter permits variables ranging over individuals and properties, while the former permits only object language variables ranging over individuals. I

motivate this stricter constraint based on data that show that properties that do not correspond to individuals may not bind variables, e.g., properties that do not correspond to kinds may not antecede the pro-form *such*.

### 1.2.1.1 The ‘Problem of Adverbs’, and a Solution

It is interesting that Chierchia suggests that only certain adverbs provide a counterexample to the *No Functor Anaphora* constraint:

Items that might constitute a serious problem for the present hypothesis are obviously adverbs. Adverbs seem to enter various anaphoric processes such as *wh*-movement or comparative formation, and to have pro-forms (*thus, so*)...

Chierchia goes on to point out that only three types of adverbials are problematic: manner adverbials, locatives, and temporal modifiers correspond to pro-forms (*thus, there, and then*), while adverbs like *again* and *almost* do not. Building on Landman and Morzycki (2003), I will argue below that this is because it is exactly these three types of adverbials that correspond to individuals. Specifically, *thus, there, and then* denote variables event-kinds, locations, and times, respectively.

### 1.2.2 Baker (2003)

Baker (2003) also proposes a restriction on possible pro-forms and gaps, namely, that only nouns (and their phrasal projections) can participate in anaphoric relations, that is, they alone may antecede or occur as pronouns or gaps (for Baker, traces):<sup>17</sup>

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<sup>17</sup> In Fall 2004, I was excited to find that Mark Baker independently came to similar conclusions about restrictions on pro-forms and traces in his 2003 book, *Lexical Categories*. It has since been very illuminating to think about the differences between his constraint and my own.

I therefore predict that there should be no such thing as “pro-adjectives” or “pro-verbs” in languages of the world that take part in anaphoric relationships with APs and VPs in the same way that pronouns enter into anaphoric relationships with NPs. Prima facie, this seems to be true: virtually every grammar has an index entry for pronouns, but very few mention pro-adjectives or pro-verbs. It is also perfectly possible to work on a language like Mohawk or Edo hard for more than five years and never encounter anything one is tempted to analyze in this way. (Edo is rich in proverbs, but that is another story.) [Baker 2003, p. 129]

Baker’s main interests lie in articulating the core differences among lexical categories; nouns, he argues, have a unique semantic property that permits them alone to antecede pronouns and traces. Following Geach (1962) and Gupta (1980), he takes nouns to differ from all other categories in having a *criterion of identity*: “the idea in a nutshell is that only common nouns have a component of meaning that makes it legitimate to ask whether some X is the same (whatever) as Y...” [Baker, p. 97]. To illustrate this point, he presents the contrast between the examples in (23) and those in (24), which show that nouns (whether singular, plural, mass, or abstract) may be used in the frame “X is the same \_\_\_ as Y”, while adjectives and verbs (or their phrasal projections) may not (Geach 1962):

- (23) a. That is the same man as you saw yesterday. (Baker 2003)  
b. Those are the same women as we saw last night.  
c. That is the same water as was in the cup this morning.  
d. We want to have the same liberty as they have.

- (24) a. #That is the same long as this. (Baker 2003)
- b. #She is the same intelligent as he is.
- c. #I saw Julia the same sing as Mary did.
- d. #I watched Nicholas the same performs a stunt as Kate performed.

He contends that although the examples in (24) would be ruled out on syntactic grounds, as only nouns may follow a determiner and adjective, these examples are further “semantically incoherent”, as only nouns have a criterion of identity. Analyzing nouns in this way, he argues, explains those properties that set them apart from the other lexical categories. In particular, this explains why nouns alone: (i) support individuation and counting (and thus may occur with number marking); (ii) may occur with quantifiers and determiners; (iii) may antecede or occur as pronouns, reflexives and traces; and (iv) may serve as arguments of predicates. I will restrict the discussion here to the third property of nouns, i.e., that they alone participate in anaphora. Before looking at Baker’s empirical arguments for this position, a few comments can be made to compare his proposal to my own. The differences between the two proposals, I think, are subtle – the two in large part overlap in predictions – but they do differ. On the empirical side, his constraint predicts the absence of pro-forms that are syntactically non-nominal, while mine does not, and it does seem that such expressions do occur (e.g., adverbial *thus*). On the conceptual side, our proposals are alike in that they both attribute the potential to participate in anaphora as being tied to individual-hood, his via the criterion of identity. Our proposals differ, however, in that I do not assume that individuals are not necessarily linked to nominal meanings. For example, events – which are commonly used to model verbal meanings –

can be counted (Krifka 1992, Landman 1996), quantified (Berman, von Stechow 1994 and others), provide the reference for pro-forms and traces, and may serve as arguments of predicates (Chierchia 1984 and others). The situation is similar for degrees, which may also be counted, quantified, provide the reference of a pro-form or trace, and may serve as arguments of predicates, without necessarily being introduced by nouns. I will try to illustrate these points more clearly in the next sections by reviewing the empirical evidence presented to support Baker's view, concentrating here on the predictions his account makes for anaphora and movement.

### 1.2.2.1 Anaphora

Baker proposes that the fact that nouns have a criterion of identity is represented syntactically by indexing, so that nouns are the only lexical category to bear an index. As a result, only nouns may antecede pro-forms. He presents (25) and (29) to illustrate this: although both genitive nominals and nationality adjectives can express the agent in a nominalization, as the examples in (25) show, only the genitive can antecede a pronoun, as the example in (26) shows (Kayne 1984).

- (25) a. Abania's resistance (Baker 2003)  
b. the Albanian resistance

- (26) a. Albania<sub>i</sub>'s destruction of itself<sub>i</sub> grieved the expatriate community.  
b. \*The Albanian<sub>i</sub> destruction of itself<sub>i</sub> grieved the expatriate community.

These sorts of examples come from Kayne (1984) (as Baker points out) who concluded from them that adjectives cannot bind pro-forms of a different syntactic category; this conclusion seems to me plausible here, and would be consistent with my own proposal. Baker, in contrast, suggests that these examples follow from his theory of nouns, since nouns alone may bear a referential index. However, to rule out Kayne's type of explanation, one would want to make sure that there are also no pro-forms which themselves have the distribution of adjectives and verbs, which Baker does claim to be the case. He looks in detail at two candidates in English, *so*, which appears to have the distribution of a predicate AP (Corver 1997), as (27) shows, and VP Ellipsis, which appears to have the distribution of a VP, as (28) shows, and argues that neither in fact present counterexamples to his proposal.

- (27) a. Chris is brave<sub>i</sub>, and Pat seems so<sub>i</sub> too. (Baker 2003)  
 b. I consider Chris intelligent<sub>i</sub>, and Mary considers Pat so<sub>i</sub>.

- (28) Chris will solve the problem<sub>i</sub>, and Pat will  $\emptyset$ <sub>i</sub> too. (Baker 2003)

*So*, he argues, is not actually an AP pro-form, as it does not quite have the distribution of an AP. In particular, unlike APs, *so* may not occur as a resultative secondary predicate:<sup>18</sup>

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<sup>18</sup> He also points out that adjectives can be pre-nominal, whereas *so* cannot, as (i) shows, but it likely that in these cases *so* alternates as *such* (see Chapter 2.)

(i) \*Mary is an intelligent woman, and John is a so man.

- (29) a. ??John beat the iron flat<sub>i</sub> and Mary beat the copper so<sub>i</sub>. (Baker 2003)  
 b. ?\*The chair is already clean<sub>i</sub>, and Chris will wipe the table so<sub>i</sub> too.

He proposes instead that *so* functions a pro-PredP, where PredP is a functional projection that dominates an AP in examples like (29a) and (b) above.<sup>19</sup> It is unclear from Baker's discussion, however, how PredP would be nominal.

Baker also argues that VP Ellipsis is not a pro-form at all, but instead has internal syntactic structure. As he points out, although there are parallels between VP Ellipsis and pronominal anaphora, there is evidence that VP Ellipsis should not be analyzed as a variable over VP meanings. I will take this up again in Chapter 3.

Baker does not look closely at some of the other potential non-nominal pro-forms mentioned above. Expressions such as adverbial *so* in English, whose analogue in Polish (*tak*), for example, does not inflect as a nominal (Landman and Morzycki 2003; see Section 2.4 below), it seems would be problematic for his proposal, unless these pro-forms could be argued to be nominal

### 1.2.2.2 Movement

It follows from Baker's theory of lexical categories that only NPs should be able to move, as only they can bind traces. In support of this, he observes that NPs can undergo certain movement operations that APs and VPs may not. For instance, restrictive relatives (30),

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<sup>19</sup> It is unclear to me that this 'inverted' use of *so* is actually a pro-form, and not something more like the expression *too*. The following examples suggest that the inverted *so* may be compatible with the pro-VP *do so*, suggesting that this *so* is more like *too*:

- (i) a. ?Chris is protesting, and so is Pat doing so.  
 b. Chris is protesting, and Pat is doing so, too.

clefts (31), and *tough*-movement (32), he observes, do not allow for gaps corresponding to APs or VPs (examples based on Baker's):

(30) *Relative Clauses*

- a. \*I am not clever<sub>i</sub> that he is *t*<sub>i</sub>. AP
- b. \*Mary will sing<sub>i</sub> that Pat will *t*<sub>i</sub>. VP

(31) *Clefts*

- a. ??It's smart<sub>i</sub> that Chris is *t*<sub>i</sub>. AP
- b. \*It's sing<sub>i</sub> that Mary will *t*<sub>i</sub>. VP

(32) *Tough-Movement*

- a. ??Content<sub>i</sub> is hard to be *t*<sub>i</sub>. AP
- b. \*Solve this problem<sub>i</sub> is hard to make them *t*<sub>i</sub>. VP

In contrast, *wh*-questions, fronting, and so-called *though*-movement do seem to permit AP and VP gaps:

(33) *Wh-Questions*

- a. How tall<sub>i</sub> is Chris *t*<sub>i</sub>? AP
- b. (none) VP

(34) *Fronting*

a. ...hard-working<sub>i</sub>, he is *t<sub>i</sub>*. *AP*

b. ...and clean his room<sub>i</sub>, he did *t<sub>i</sub>*. *VP*

(35) *Though-Movement*

a. Hard-working<sub>i</sub>, though he is *t<sub>i</sub>*... *AP*

b. Solve this problem<sub>i</sub>, though he did *t<sub>i</sub>*... *VP*

Baker proposes explaining this contrast by distinguishing the syntax of these two sets of *wh*-constructions: the former involve null operator movement from the gap within the embedded clause, while the latter are instances of copy movement. In effect, only the former set of cases necessitate operator-variable binding structures, and since only NPs bear referential indices, no other category may correspond to the bindee in these structures. In contrast, copy movement, Baker assumes, does not require operator-variable binding, which is why AP and VP movement is permitted for the latter set of cases.

My own explanation of these facts, as mentioned above, will be quite similar: those instances of movement that involve variable binding at LF do not permit binding of higher-type variables; this rules out, e.g., the examples in (30).<sup>20</sup> I will, however, assume that *wh*-constructions may be analyzed as instances of copy-movement and be semantically interpreted as operator-variable structures (Chomsky 1995, Rullman and Beck 1998, Sauerland 1998, 2004, Fox 2000). Further, I will assume that examples like (33a) are cases of pied-piping, and involve reconstruction at LF, so that the variable abstracted

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<sup>20</sup> I will not look closely at clefts in this thesis, but hope to return to these important cases in future work.

over for such questions ranges over degrees, construed as individuals, and not AP meanings (presumably, properties of individuals); *wh*-questions, then, for me, do involve operator-variable binding.

In sum, Baker and I propose similar constraints, which limit the types of pro-forms and movement constructions expected to occur in natural language. Baker states his claim syntactically, i.e., no NP anaphora, but what follows from his semantic criterion of identity criterion may amount to the constraint I argue for here, NHTV.

### 1.3 Theoretical Framework

I will assume in large part the compositional, type-driven framework articulated in Heim and Kratzer (1998). In this system, the semantic component directly interprets phrase structure trees, or, more specifically, Logical Forms (LFs). LFs are disambiguated representations, which, in addition to representing syntactic structure, mark anaphoric relations by co-indexing, and represent quantifier scope as the result of a rule of Quantifier Raising (QR). When QR occurs, an indexed trace occupies the base position of the moved constituent, and an index binding that trace is adjoined to the sister of the moved constituent (but see discussion of reconstruction in Section 4.2 below). The LF of (36a), for example, is (minimally) that in (36b):

- (36) a. Maria described every guest.  
b. LF:  $[_{IP} [_{DP} \text{every guest}] 1 [_{IP} \text{Maria} [_{VP} \text{described } t_i]]]$ .

In the tradition of Montague, expressions are categorized by their semantic type: assuming as the two basic types individuals (type  $e$ ) and truth values (type  $t$ ), the inventory of possible semantic types and their denotation domains can be defined recursively, as in (37).

(37) *Semantic Types*

- a.  $e$  and  $t$  are semantic types.
- b. If  $a$  and  $b$  are semantic types, then  $\langle a, b \rangle$  is a semantic type.
- c. If  $a$  is a type, then  $\langle s, a \rangle$  is a type.
- d. Nothing else is a type.

*Semantic Denotation Domains*

- a.  $D_e := D$  (the set of individuals).
- b.  $D_t := \{0, 1\}$  (the set of truth values).
- c. For any semantic types  $\sigma$  and  $\tau$ ,  $D_{\langle \sigma, \tau \rangle}$  is the set of all functions from  $D_\sigma$  to  $D_\tau$ .

The interpretation function,  $\| \cdot \|$ , assigns to each syntactic node of type  $a$  an element of  $D_a$ , with respect to a variable assignment,  $g$ . The interpretation function is defined by the following rules of semantic composition, from Heim and Krazter (1998).

(38) *Lexical Terminals*

If  $\alpha$  is a terminal node occupied by a lexical item, then  $\|\alpha\|$  is specified in the lexicon.

(39) *Non-Branching Nodes*

If  $\alpha$  is a non-branching node, and  $\beta$  is its daughter, then, for any assignment  $g$ ,  $\alpha$  is in the domain of  $\|\cdot\|^g$  if  $\beta$  is. In this case,  $\|\alpha\|^g = \|\beta\|^g$ .

(40) *Functional Application*

If  $\alpha$  is a branching node and  $\{\beta, \gamma\}$  the set of its daughters, then, for any assignment  $g$ ,  $\alpha$  is in the domain of  $\|\cdot\|^g$  if both  $\beta$  and  $\gamma$  are, and  $\|\beta\|^g$  is a function whose domain contains  $\|\gamma\|^g$ . In this case,  $\|\alpha\|^g = \|\beta\|^g(\|\gamma\|^g)$ .

(41) *Predicate Modification*

If  $\alpha$  is a branching node and  $\{\beta, \gamma\}$  the set of its daughters, then, for any assignment  $g$ ,  $\alpha$  is in the domain of  $\|\cdot\|^g$  if both  $\beta$  and  $\gamma$  are, and  $\|\beta\|^g$  and  $\|\gamma\|^g$  are both of type  $\langle e, t \rangle$ . In this case,  $\|\alpha\|^g = \lambda x : x \in D$  . and  $x$  is in the domain of  $\|\beta\|^g$  and  $\|\gamma\|^g$ .  $\|\beta\|^g = \|\gamma\|^g = 1$ .

(42) *Predicate Abstraction*

Let  $\alpha$  be a branching node whose daughters are  $\beta$  and  $\gamma$ , where  $\beta$  dominates a numerical index  $i$  or indexed  $wh$ -word,  $wh_i$ .

Then, for any variable assignment  $g$ ,  $\|\alpha\|^g = \lambda x : x \in D$  and  $\gamma$  is in the domain of  $\|\cdot\|^{g[x/i]}$  .  $\|\gamma\|^{g[x/i]}$  .

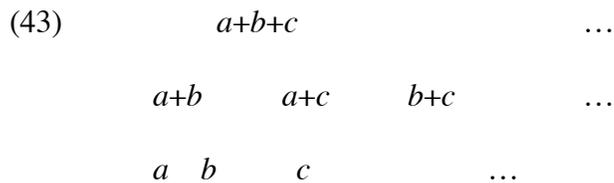
These rules of composition, together with the assumption that phrase structure trees are at most binary branching, ensure an extensional, compositional, type-driven semantic interpretation system.

### 1.3.1 The Domain of Individuals

Because my analysis rests on the assumption that D is multi-sorted, this section spells out in more detail my assumptions about what constitutes D.

#### 1.3.1.1 Plural Individuals

Following Link (1983), I will assume that D contains both singular and plural individuals. That is, D forms a complete atomic join semi-lattice, ordered by the ‘part of’ relation,  $\leq$ , as illustrated in (43).



In the structure above,  $a$ ,  $b$ , and  $c$  are atomic (or *singular*) individuals,  $+$  is an individual sum operator, and the lines represent the *part of* relation. Expressions denoting atomic individuals include names of individuals such as *John* and *Mary*, as well as singular pronouns like *he* or *she*. Expressions denoting plural individuals include plural definite descriptions such as *the boys* and *the girls*, as well as plural pronouns like *they* or *them*.

### 1.3.1.2 Kinds as Individuals

I will also assume that the domain of individuals,  $D$ , includes kinds (Carlson 1977b, Krifka et al. 1995, and references therein). Following Krifka et al. (1995), I will model kinds as pluralities, the sum of all instances of the kind. For example, the dog-kind,  $DOG$ , is the sum of all dogs.<sup>21</sup> Kinds may be mapped to properties of individuals that instantiate them, via the predicativizing operator,  $\cup$ , which can be defined as follows:

(44) *Predicativization*

Let  $k$  be a kind. Then,  $\cup k = [\lambda x . x \leq k]$ .

Similarly, properties may be mapped to kinds by the nominalizing operator,  $\cap$ , defined as follows:

(45) *Nominalization*

For any property  $P$ ,  $\cap P =$  the largest member of  $P$ , if the largest member of  $P$  is a kind; undefined, otherwise.

In line with Carlson (1977b) and Chierchia (1995), I will assume what qualifies as a kind is broad and often context-dependent:

By ‘natural’ kinds, we do not necessarily mean... just biological ones or even ‘well-established’ ones. Artifacts (like chairs or cars) or complex things (like intelligent students or spots of ink) can qualify as kinds, to the extent that we can impute to them a sufficiently regular behavior (cf. on this Carlson1977b, pp. 26ff. and Krifka et al. 1995).

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<sup>21</sup> This construal of kinds is a simplification, as kinds are almost certainly in fact intensional items; I believe that this does not matter for my purposes here.

What counts as kind is not set by grammar, but by the shared knowledge of a community of speakers. It thus varies, to a certain degree, with the context, and remains somewhat vague. Lexical nouns identify kinds. Complex nouns may or may not. [Chierchia 1998]

Some complex nouns, then, may correspond to kinds, while others may not, depending on the context in which they are used. When a complex noun does not correspond to a kind, e.g., *people in the next room*, it can be assumed to be out of the domain of the *down* operator.

#### **1.4 Summary**

This concludes Chapter 1. In the following chapters, I will present a case for NHTV, by (i) looking at potential counterexamples on a case-by-case basis, and (ii) showing that hypothetical higher-type variables are systematically missing.

## CHAPTER 2

### PRO-FORMS AND VARIABLES: *SUCH* AND ITS KIN

#### 2.1 Introduction

In this chapter, I will look at the syntax and semantics of a set of pro-forms that have the syntactic distribution of higher-type expressions – adjectives and adverbs, in particular – and thus make good candidates for higher-type variables. The focus will be the English word *such* (Bolinger 1972, Bresnan 1973, Carlson 1977b, Siegel 1994, Wood 2002), and what are arguably related forms. These cases are illustrated in the following examples, repeated from (6) – (9) above:

- (46) Those little<sub>i</sub> cars look good, but few such<sub>i</sub> cars are safe. *AP*
- (47) You have to dance this dance with a definite sense of pride and haughtiness<sub>i</sub>, and if danced thus<sub>i</sub>/so<sub>i</sub>, the dance will be beautiful. *AdvP*
- (48) Whenever Sophie starts laughing<sub>i</sub>, Bill does so<sub>i</sub> too. *VP*
- (49) I thought she would be happy<sub>i</sub>, but she certainly doesn't seem so<sub>i</sub>. *AP*

The remainder of the chapter is organized as follows. In Section 2.2, I will argue that *such* is best analyzed as associated with a variable that ranges over individuals, following Carlson (1977b), and contra Siegel (1994), who analyzes *such* as a property variable. In Section 2.3, I will extend this analysis of *such* to the semantics of its informal paraphrase, adnominal *like that*.

In Section 2.4, following Landman and Morzycki (2003), I will also extend this analysis of *such* to its adverbial analogues in Polish and German, *tak* and *so*, with the result that these too vary over individuals. In Section 2.5, I will compare the semantics of *tak* and *so* to adverbial *like that* in English.

Finally, in Sections 2.6 and 2.7, I will suggest that other instances of *so* in English, namely the *so* of *do so*, as well as predicative *so* (e.g., *She seems so*), also share a semantics with *such*, so that all of these cases receive a unified semantics.

In each case, I re-examine the evidence for treating these expressions as higher-type variables and conclude that they in fact instead vary over individuals.

## 2.2 What's *Such*?

*Such*, at least at first sight, is a very good candidate for a higher-type variable. Syntactically, it appears to be adjectival, as it may occur between a determiner and a noun, a position commonly taken to be reserved for adjectives (or adjectival projections):

(50) Several/many/three/few/most/many *such* mistakes were found.

Semantically, it appears to be able to pick up the reference of a preceding adjective, as the following examples illustrate:

- (51) a. Nice<sub>i</sub> people... such<sub>i</sub> people...  
b. Little<sub>i</sub> dogs... such<sub>i</sub> dogs...  
c. Strange<sub>i</sub> ideas... such<sub>i</sub> ideas...

Assuming that adjectives like *nice*, *tall*, and *strange* – at least at the level of their maximal projections – denote properties, these examples suggest a treatment of *such* as a variable ranging over properties. An analysis along these lines is in fact proposed in Siegel (1994). However, in the spirit of Carlson (1977b), I will look at evidence that *such* is not a property variable. Rather, it is associated at LF with a variable that varies over either (i) kinds (construed here as individuals) or (ii) object individuals that instantiate kinds.

### 2.2.1 Setting aside the Ambiguity

Before looking further at *such*, it will be useful to first set aside a use of *such* that I will not be concerned with here. The word *such* in English often gives rise to ambiguous sentences (Bolinger 1972, Bresnan 1973), as (52) illustrates:

(52) Hilda is such a scholar. (Bresnan 1973)

On one reading, (52) might be paraphrased as ‘Hilda is that kind of scholar’ or ‘Hilda is a scholar like that’, and on a second reading, as ‘Hilda is so much of a scholar’ or ‘Hilda is very much a scholar’. Following the terminology of Bresnan (1973), I will refer to the first use of *such* as ‘kind’ *such*, and the second as ‘degree’ *such*.<sup>22</sup> I will for the most part only be concerned with kind *such* here, since that is the use on which *such* acts like an adjectival pro-form (i.e., varies depending on its linguistic environment). In order to isolate this use of *such*, it will be useful to point out some systematic differences between the two uses; the remainder of this section is devoted to this end.

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<sup>22</sup> Bolinger (1972) uses the terms ‘identifier’ *such* and ‘intensifier’ *such*, respectively.

There are a number of properties that distinguish kind and degree *such*, and they are to some extent in complementary distribution. For instance, when *such* occurs with a *that*-clause, only its degree reading is available:

(53) Hilda is such a scholar *that all her work is impeccable*. (Bresnan 1973)

In contrast, when *such* occurs with an *as*-clause, only its kind reading is available:

(54) Hilda is such a scholar *as you were speaking of just now*. (Bresnan 1973)

The two uses also differ in the types of nominals they may modify: the degree use of *such* is only available when *such* modifies a *gradable predicate*, while the kind use of *such* is not subject to this restriction (Bolinger 1972).<sup>23</sup> For example, compare the ambiguous sentences in (55) with the unambiguous examples in (56).

(55) a. Such strange theories have become quite popular.

b. We have made such mistakes.

(56) a. Such theories have become quite popular.

b. We have found such evidence.

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<sup>23</sup> I assume a gradable nominal is one that either contains a gradable adjective, i.e., an adjective that may occur with degree morphemes like *so*, *too*, or *as* e.g., *strange*) or a gradable noun (e.g., *mistake*, *loudmouth*).

In (55a-b), *such* occurs with a gradable predicate, e.g., *strange theories* and *mistakes*, respectively, and as a result both readings are available. In contrast, in (56a-b), *such* occurs with a non-gradable nominal (e.g., *theories*, *evidence*), and only the kind reading is available.

The two uses also differ with respect to the determiners with which they may co-occur. Only identifier *such* may occur between a determiner and a noun, as the following unambiguous examples illustrate:

(57) We have made {three/few/most/many} such mistakes.

Both uses may, however, occur in bare, i.e., determinerless, DPs, e.g., *such mistakes*, and both uses may occur with the singular indefinite, e.g., *such a scholar*. In the latter case, both uses must (infamously) occur *before* the indefinite determiner *a*, a peculiar, and often observed, fact:

(58) \*Hilda is a such scholar.

I will not attempt to account for this curious property of *such* in this work, except to note, as have many others, that DegP's also display this distribution:<sup>24</sup>

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<sup>24</sup> Further, neither use of *such* can occur with a definite determiner (including possessives):

(i) \*the/those/John's such mistake

See further discussion in Section 2.2.7 below.

- (59) a. Bill is that tall/too big/so boring/as smart a linguist.  
b. \*Bill is a that tall/too big/so boring/as smart linguist.

The two uses are also pronounced differently: degree *such* always bears a pitch accent, while kind *such* may, but need not.

Finally, kind *such* is of a formal register, while degree *such* is common in both informal and formal speech. In informal speech, the expressions *like that* or *of that kind* are preferred in place of kind *such*, so that, for example, *such theories* could be more informally paraphrased as *theories like that* or *theories of that kind*.

To sum up, the two uses of *such* can be distinguished by the following properties: (i) kind *such* takes a subordinate *as*-clause, while degree *such* takes a subordinate *that*-clause; (ii) degree *such* only occurs with gradable nominals; (iii) kind *such* may occur between a determiner and a noun, while degree *such* may not; (iv) degree *such* bears a pitch accent, while kind *such* may not; and (v) kind *such* is of a formal register, while degree *such* is not.

Although I will only be analyzing the kind use of *such*, it is an interesting question how these two uses of *such* are semantically related. The two uses are at least historically related, with kind *such* predating intensifier *such* (Schiller and Need 1992; Roger Higgins, p.c.).<sup>25</sup> I will set this issue aside here, however, and henceforth simply use *such* to refer to kind *such* (see, though, Landman and Morzycki (2003) for speculation on

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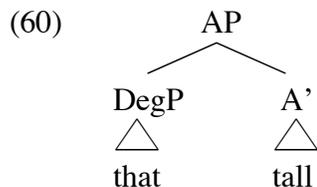
<sup>25</sup> Bolinger sees the semantics of degree *such* as derived from kind *such*: "...the identifier has fallen out of many contexts except in formal register, giving way to the intensifier, probably because the 'suchness' of something is so likely to be an intensifiable characteristic. We begin by viewing it as pointed to, and end by viewing it as worthy of note, hence as enhanced."

the connection between kind *such* and degree *such*, in the context of a concrete proposal for the semantics of kind *such*)

### 2.2.2 Syntax of *Such*

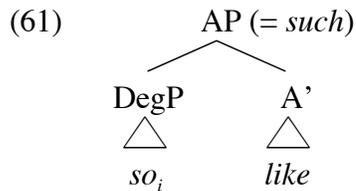
Carlson (1977b), building on Bresnan (1973), shows that *such* in many respects displays the distribution of a *Deg~A* sequence, e.g., *so tall*, where *so* is a Deg and *tall* is an A (other Degree words include e.g., *that*, *too*, *so*, *as*, *how*, and *-er*). I will follow Carlson and Bresnan in assigning to *such* the same syntax as these *Deg~A* sequences, which I will refer to as degree constructions.

The syntax of degree constructions has received a good amount of attention in the literature, and a number of different analyses have been proposed to account for them. I will adopt here what Bhatt and Pancheva (2004) refer to as the *classical view*, according to which Degree words head a DegP that occupies the specifier of AP (see Chomsky 1965, Selkirk 1970, Bresnan 1973, Heim 2000, and others, and cf. Abney 1987, Corver 1990, 1997, Grimshaw 1991, Kennedy 1999, who take DegP to be the functional projection of AP):

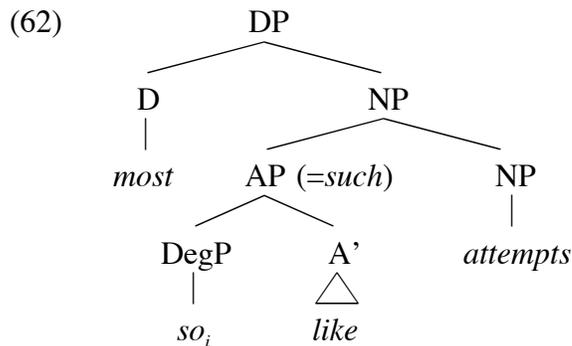


I will adopt an analogous syntax for *such*. Specifically, I will posit for *such* the structure in (61), in which it is composed of two parts: the Degree word *so* – which is associated

with an index, reasons for which will be spelled out in the following section – and the adjective *like*:



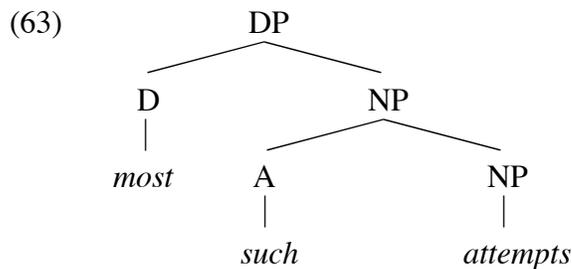
Further, in line with Svenonius (1993), I assume that APs may adjoin to NP:



This syntax for *such* is in accord with its historical development, as *such* derives from the Germanic compound *\*swa+lk*, “so-like” (Higgins, p.c.). My main justification for this decomposition of *such* is that it will put *such* compositionally on a par with other degree constructions (e.g., *that tall*, *so tall*, *as tall*); this, I will argue, explains certain syntactic and semantic parallels between *such* and other Degree expressions such as *so*, *as*, and – *er*, and *how*. This construal of *such* will also help elucidate its relation to its more colloquial paraphrase, *like that*, as the demonstrative *that* and the posited *so* appear to make the same semantic contribution (see Section 2.3). I will motivate this syntax for *such* in the remainder of this section, by showing that *such* has the distribution of a degree con-

struction; evidence that *such* has this internal structure will come from looking at its semantics, which I will justify in Sections 2.2.2-2.2.5. I will note here, however, that this particular construal of *such* does not have bearing on the main claim of this thesis, which is that *such* varies over individuals; other accounts of the syntax of *such* could easily maintain that it varies over individuals, without positing the abstract decomposition in (61).

Siegel (1994) argues against the complex AP syntax for *such*, proposing instead that *such* has the distribution of a simple adjective:



I will, however, motivate the complex AP analysis here because (i) my intuitions are more in line with the data Carlson presents in favor of that analysis, than with Siegel’s counterarguments, as I will show in the remainder of this section, and (ii) as stated above, treating *such* as complex AP will make it possible to provide a semantic account of *such* parallel to that of other degree construction, as well as to its informal paraphrase, *like that*. The remainder of this section reviews the syntactic evidence for the complex AP analysis of *such*.

There are several ways in which *such* behaves like a complex AP, and unlike a simple adjective. First, just as complex APs must precede all other modifiers of the head

noun, as (64) shows (i.e., the AP *sicker* must precede the modifier *fat*), so must *such*, as (65) shows.

(64) a. He is a sicker fat boxer than I had remembered. (Carlson 1977b)

b. \*He is a fat sicker boxer than I had remembered

(65) a. I prefer such Kiswahili textbooks.

b. \*I prefer Kiswahili such textbooks.

Simple adjectives, in contrast, may often precede or follow other modifiers (although there are some well-known restrictions on their ordering):

(66) a. He is a sick fat boxer. (Carlson 1977b)

b. He is a fat sick boxer.

Second, just as complex APs may not co-occur with one another, as (67) shows, *such* cannot modify an NP that already contains another complex AP, as (68) shows.

(67) a. \*They are fat enough sicker boxers. (Carlson 1977b)

b. \*They are sicker fat enough boxers.

(68) a. \*They are quicker such rabbits. (Carlson 1977b)

b. \*They are such quicker rabbits.

Simple adjectives, in contrast, may co-occur with complex APs:

(69) They are quicker brown rabbits.

Third, like (at least some) other complex APs, *such* is positioned to the left of the indefinite determiner *a*:<sup>26</sup>

(70) a. Bill is that tall/too big/so boring/as smart a linguist.

b. \*Bill is a that tall/too big/so boring/as smart linguist.

(71) a. Such a man was here earlier.

b. \*A such man was here earlier.

Simple adjectives of course do not occur in this position:

(72) a. A well-dressed man was here earlier.

b. \*Well-dressed a man was here earlier.

Fourth, *such*, like other DegPs, may not occur with the definite determiner, *the* (Bresnan 1973):<sup>27</sup>

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<sup>26</sup> I will not attempt an explanation of this puzzling property of *such* here. Roger Higgins (p.c.) suggests that the inversion (both for *such* as well as complex APs like *so big*) may date historically to the phonological ill-formedness of having two adjacent phonologically weak functional heads. For example, *so big a boy* would be *a so big boy* without inversion, which results in *a* and *so* being adjacent. See Section 2.2.7 for a brief discussion of the semantics of this construction.

(73) \*Bill is the that tall/too big/so boring/as smart linguist.

(74) \*The such man was here earlier.

Simple adjectives are fine with the definite determiner:

(75) The young man was here earlier.

Finally, *such*, like other Degree words, may take what appears to be an optional clausal complement that has the structure of a relative clause:

(76) a. Bill is *too* tall a player *for us to have on the team*. (Carlson 1977b)

b. Smarter men *than we have seen today* do exist.

c. Bill is *as* nice *as Julie is*.

d. *Such* people *as we have seen today* should be given a second chance.

To summarize, *such* is like a complex AP, and unlike a simple adjective, in that it (i) must precede other nominal modifiers, (ii) cannot co-occur with other complex APs, (iii) precedes the indefinite determiner, *a*, (iv) may not occur with the definite determiner *the*, and (v) occurs with an optional complement clause that has the structure of a relative clause.

Siegel finds the sentences in (65b) and (68) acceptable, and concludes that *such* is a simple adjective. Although Carlson and Siegel disagree over sentences that are some-

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<sup>27</sup> The incompatibility of DegPs with the definite determiner is probably a semantic issue, and not a syntactic one, but the parallel still holds.

times rather hard to judge, I find my own intuitions more in line with Carlson's, and so will adopt his syntax. Further, as stated above, this syntax will make possible a compositional semantics for *such* straightforwardly parallel to degree constructions, as well as to its informal paraphrase, *like that* (as shown at the end of the next section, Section 2.2.3.)

### 2.2.3 Semantics of *Such*

As observed above, examples like the following (repeated from above) suggest an account of *such* as a property variable, as *such* appears to pick up the reference of a preceding adjective:

- (51) a. Nice people... such people...  
b. Little dogs... such dogs...  
c. Strange ideas... such ideas...

In fact, as Carlson observes, *such* appears to be able to pick up the reference of virtually any sort of NP modifier, "be it adjective, PP, relative clause, or participle." He provides the following examples:

- (77) a. Old ladies... such ladies... (Carlson 1977b)  
b. People owning dogs... such dogs...  
c. Cats without tails... such cats...  
d. People who eat fish... such people...

These examples suggest a treatment of *such* as a property variable, taking as its value a property that corresponds to an expression that may modify a nominal, e.g., an AP, PP, CP, or gerund.<sup>28</sup>

There are, however, several empirical problems for this sort of approach, as both Carlson and Siegel observe. For one, *such* seems to be able to pick up the reference of constituents that are not modifiers. For example, in the following, *such* seems to refer back to whole DPs:

- (78) a. “Honest money lenders? There are no such people.”  
b. “... with politicians, journalists, and other such important personages.”

(Carlson 1977b), attributed to Jespersen (1927)

Examples like these, as both Carlson and Siegel conclude, suggest that *whole DPs* – and not just nominal modifiers – antecede *such*. Thus, in an example like (51a), repeated below, the antecedent of *such* would be the whole DP *nice people*, and not just the modifier *nice*:

- (51) a. Nice people... such people...

Carlson and Siegel, however, draw different conclusions about the semantics of *such* from these sorts of examples. Siegel argues that *such* is indeed a property variable, but

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<sup>28</sup> Note that since there is no formal way to distinguish properties denoted by modifiers (e.g., *tall*) from properties denoted by nominals (e.g., *women*), there is nothing here that would ensure that *such* would be assigned an adjectival property rather than a nominal property. This point will be relevant for the discussion of Siegel’s account of *such* below.

subject to the restriction that its syntactic antecedent must be a common noun phrase (here, an NP, given the DP hypothesis), and not an AP. NPs, like APs, are commonly taken to denote properties; thus, by Siegel's account, *such* would be a property variable, but require an NP antecedent. For example, the antecedent for *such* in (78) and (51a) would be whatever corresponds to an NP in a bare plural (there are numerous proposals about the syntax of bare plurals, so this could be, e.g., either the bare plural itself, or some layer within a bare plural). Siegel supports this account of *such* with the contrast between (79a-b) below: (79b) would be judged bad because in it the NP *tall men* co-refers with *such*, with the result that *such women* yields the intersection of 'the contradictory predicates *woman*, and *tall man*.'

- (79) a. All tall men believe that employers prefer such people. S., [28]  
 b. \*All tall men believe that employers prefer such women.

The main problem with this analysis, however, is that not just any nominal may antecede *such*, as Carlson observes. In particular, nominals denoting properties that do not correspond to *kinds* do not make good antecedents for *such*, which suggests that *such* is anaphoric not to a property, but to a kind. Consider, for instance, the following examples, in which *such* is used infelicitously; note that intuitively, these examples are judged unacceptable because the antecedent bare plurals do not provide enough information about a *kind* (of people, elephants, men, or quarters) to permit the use of *such*; for instance, (80a) is judged ungrammatical because *people in the next room* does not provide enough information about a *kind* of people to permit the use of *such*.

- (80) a. People in the next room... ??such people (are obnoxious)  
 b. Elephants that are standing there... ??such elephants  
 c. Men that Jan fired this morning... ??such men  
 d. Quarters that I put in the meter yesterday... ??such quarters

(Carlson 1977b)

However, (80a) may in fact be judged acceptable if further information from the linguistic or non-linguistic context makes salient a kind of people. Consider, for example, a context in which the people in the next room happen to be making a lot of noise. The following might then be uttered, in which *such* is used acceptably:<sup>29</sup>

- (81) I can't stand the people in the next room. Such people are obnoxious.

Importantly, in this context, *people in the next room* can be used to recover a kind from the context, namely, the kind LOUD PEOPLE, and as a result *such* may be used to pick out this kind of people. The important point here is that a kind of people cannot be made sali-

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<sup>29</sup> Thanks to Angelika Kratzer for pointing out examples like (81), in which an instance of a kind appears to antecede *such*. She suggests based on these examples that *such* is associated with an object variable that instantiates a kind; see further discussion on this issue immediately below. Barbara Partee (p.c.) provides similar examples in which expressions denoting object individuals – and not kind -- appears to either antecede or make salient a kind for *such*:

- (i) a. Two men came in. I had never seen such men before.  
 b. *War and Peace*, *Gone With the Wind*, and other such hefty classics...

ent just by virtue of their being in the next room. Rather, some *kind* of people must be made salient to permit the use of *such*.<sup>30</sup>

Kinds, for Carlson, are modeled as a special type of individual in D (see again Section 1.3.1.2 for my assumptions about the representation of kinds). Linguistic expressions that denote kinds – bare plurals, for example – have unique properties, which the bare plurals in (80) do not share. For instance, only kind-denoting bare plurals may occur as arguments to the so-called *kind-level predicates*, e.g., *extinct*, *widespread*, *common*, and *rare*. While bare plurals are generally fine as arguments to these predicates, as (82) shows, the bare plurals in (80) are odd, as (83) shows.

- (82) a. People are common.  
b. Elephants are extinct.  
c. Men are widespread.  
d. Quarters are rare.

- (83) a. ??Polar bears in the next room are extinct.  
b. ??Elephants that are standing there are widespread.  
c. ??Men that Jan fired this morning are common.  
d. ??Quarters that I put in the meter yesterday are rare.

Carlson suggests that what blocks the bare plurals in (83) – those that may not antecede *such* – from denoting kinds is that they “refer to a finite set of things, which must exist at

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<sup>30</sup> Siegel judges these examples grammatical, and so sees *such* as denoting a semantically unrestricted property variable. However, from her discussion, it seems that she finds these examples judged grammatical in exactly those contexts in which a kind would be made salient.



Expressions occurring higher in the nominal projection (determiners, for example) may then combine semantically with this property:<sup>33,34</sup>

$$(86) \quad \|all\ such\ dogs\|_g = \lambda f_{\langle e,t \rangle} . \text{for all } x \text{ such that } x \text{ is a dog, } f(x) = 1.$$

This account of *such*, in effect, explains the unacceptable examples in (80): because *such* contains a kind variable, it may not be anteceded by a non-kind-denoting nominal, unless that nominal itself makes salient a kind, as in (81).

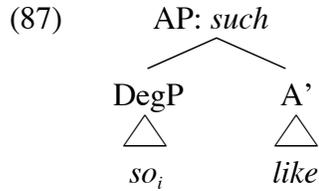
Adopting the syntax for *such* in (87) below (repeated from above), I will derive this semantics of *such* as the result of combining *so* and *like*. Specifically, *so* denotes a variable over kinds or objects, as in (88), while *like* relates a kind and an individual – specifically, it maps a kind to the property of objects that instantiate that kind – as in (89) (I will motivate this semantics for *like* in Section 2.3). Combining these two expressions by functional application produces the semantics for *such* in (90), which is essentially the same as that proposed by Carlson in (84) above.<sup>35</sup>

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<sup>33</sup> See section 2.2.6 for discussion of restrictions on the types of determiners that may occur with *such*.

<sup>34</sup> Wilkinson (1991) proposes denotations semantically equivalent to the one for *such* above (and *like that* below) for (at least some uses of) the modifiers *of that kind* and *that kind of*, as in *an animal of that kind* and *that kind of animal*. Given that they might all receive the same semantics, it would be interesting to look closely at potential differences between these four expressions.

<sup>35</sup> I motivate this semantics for *like* in Section X below, based on the use of *like* in the expression *like that*. Note, however, that in that section, I will argue that *like* is ambiguous, and also has a use in which it relates two object individuals, as in, e.g., *like John*.



(88)  $\|so_i\|^g = g(i)$

(89)  $\|like\| = \lambda k . [\lambda x . x \leq k]$

(90)  $\|such\| = \lambda x . x \leq g(i)$

This makes for a clear parallel between *such* and degree constructions like *that tall*: the *so* in *such* provides a kind argument to *like*, just as *that* provides a degree argument to *tall*, assuming that *tall* is a relation between degrees and individuals (Cresswell 1976, von Stechow 1984, Heim 2000, among others).

There is some evidence that the variable associated with *such* may range not only over kinds but also over *object* individuals (henceforth, objects). For instance, Angelika Kratzer, p.c., points out that examples like those in (91) suggest that *such* is associated with an object variable rather than a kind variable; quantification here appears to be over objects (i.e., particular mistakes), and *such* seems to co-vary with each mistake:<sup>36</sup>

- (91) a. Every time a mistake occurred, we wondered whether some such  
mistake might occur again.

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<sup>36</sup> These examples are puzzling, however, given that co-variation with *such* is in general not possible with a quantificational subject, e.g., the following example is true iff everyone must like reading some contextually salient type of books:

- (i) Everyone likes reading such books.

I am not sure how to reconcile these facts.

- b. For every mistake that occurred, we wondered whether some such mistake might occur again.

To account for the examples in (91), I will assume here that the variable associated with *so* (internal to *such*) may range over either (i) kinds or (ii) objects that instantiate kinds; and, further, that *like* is ambiguous, denoting either a relation between kinds and objects (as in (89) above), or a relation between objects and objects, as in (92) below.<sup>37</sup>

$$(92) \quad \llbracket \textit{like}_2 \rrbracket^g = \lambda x . [\lambda y . \text{there is a unique contextually salient kind } k \text{ such that } x \leq k \text{ and } y \leq k]$$

According to (92), this second use of *like* maps an object  $x$  to the property of objects that instantiate a unique contextually salient that  $x$  also instantiates. Combining this second use of *like* with *so* produces a second semantics for *such*:

$$(93) \quad \llbracket \textit{so}_i \textit{like}_2 \rrbracket^g = \lambda x . \text{there is a unique contextually salient kind } y \text{ such that } g(i) \leq y \text{ and } x \leq y$$

In the next section, I will support the analysis of *such* by which it is associated with an individual variable by looking at the semantic behavior of what is arguably its optional complement, the *as*-clause italicized in the following:

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<sup>37</sup> Again, I will motivate this ambiguity in Section 2.3, where I look directly at the semantics of *like*. In short, I see this ambiguity as analogous to the behavior of *like*, which may combine with a kind, e.g., *like that*, or an object, e.g., *like him*.

(94) Such women *as we met yesterday* are a credit to society. (Carlson 1977b)

Much of the section will focus on parallels between these *as*-clauses and the (apparent) complement clauses of other Degree words, e.g., *than*-clauses:

(95) *Smarter* women *than we met yesterday* have made worse mistakes.

#### 2.2.4 *Such-as*-Relatives

Another strategy for getting at the semantics of *such* is to look at the semantic contribution of what appears to be its optional complement, an *as*-relative:<sup>38</sup>

(96) Such women *as we met yesterday* are a credit to society. (Carlson 1977b)

In addition to *as*-relatives, *such* may also occur with an *as*-phrase, in which case only a DP follows *as*:

(97) Such women *as Frieda* are a credit to society. (Carlson 1977b)

These (putative) complements of *such* are in this respect like the (putative) complements of degree words, which may also be either clausal or phrasal:

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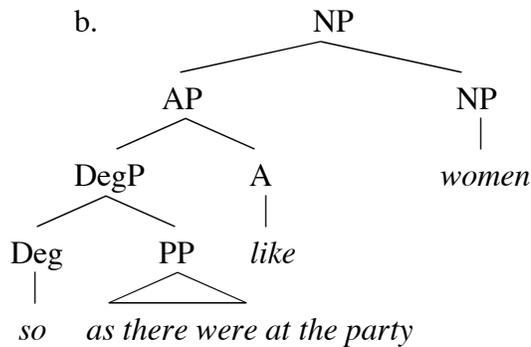
<sup>38</sup> Although these *as*-relatives sound antiquated in present-day English, I believe that judgments regarding their use are clear enough to posit an analysis for them. Further, I will show in Section 2.3 below that the analogous – but more informal – *like*-relative, illustrated in (i), behaves just like the *as*-relative (Landman 2002).

(i) Women *like we met yesterday* are a credit to society.

- (98) a. Smarter women *than we met yesterday* have made worse mistakes.  
 b. Smarter women *than Frieda* have made worse mistakes.

There is some evidence that *as*-relatives should indeed be construed as complements to *such*, even though the two are syntactically non-adjacent.<sup>39</sup> First, the presence of the *as*-relative is clearly dependent on *such*. *Such*, may not, for example, occur with a relative introduced by *than*. Second, I will present evidence below suggesting that *such* and *as*-relatives can take scope together and thus form a semantic constituent. Accordingly, I will assume that *such* and *as*-relatives form a syntactic constituent to the exclusion of the modified noun at LF, as in (99b) (abstracting away for the moment from the internal structure of the *as*-relative, and taking without justification the *as*-relative to be a PP):

- (99) a. *such* women as there were at the party

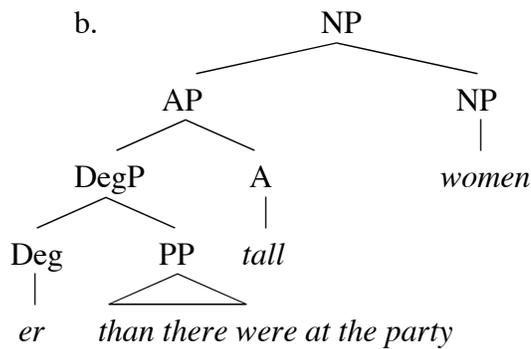


Compare this structure to analogous LFs that have been proposed for comparatives, in which the Degree head and a *than*- or *such-as*- relative are taken to form a constituent

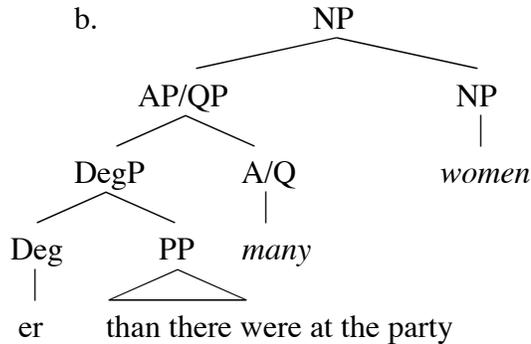
<sup>39</sup> Reasoning here will be similar to that of Bhatt and Pancheva (2004) for the relationships between a Degree head and a comparative clause.

(Bresnan 1973, 1975, Cresswell 1976, Heim 1985, and others); following Bresnan 1973, *more* is taken here to be the combination of *er* + *many*:<sup>40</sup>

(100) a. taller women than there were at the party



(101) a. more women than there were at the party



What, intuitively, seems to be the semantic contribution of these *as*-complements?

One possibility is that they directly supply *such* with the value of its kind variable. These complements, then, might be construed as a definite description of a kind (or an object

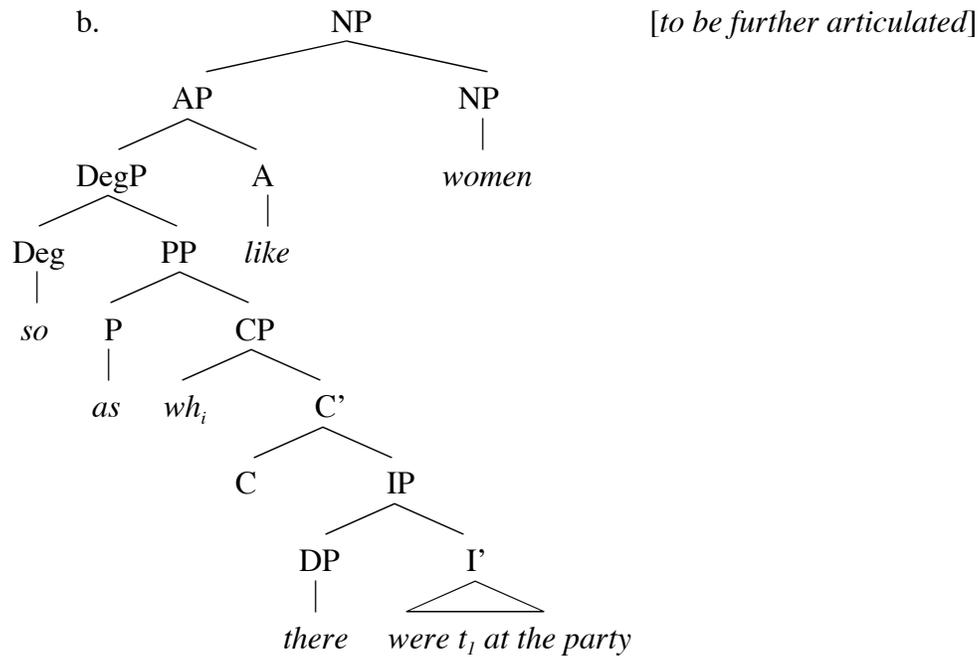
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<sup>40</sup> Heim footnotes that this structure is “probably wrong”. Bhatt and Pancheva (2004) propose an more recent account of comparatives that accounts for the fact that *than*-clauses behave as if they semantically form a constituent with the Degree head, while remaining consistent with what is known about extraposition. I believe that an analysis of this sort could be posited for *as*-clauses without affecting the main arguments here.

that instantiates a kind), analogous to some analyses of *than*-phrases as definite descriptions of a degree in comparative constructions (Russell 1905, Cresswell 1976). An alternative possibility is that they provide a restriction on the variable associated with *such* (Carlson 1977b). For example, in (96), any kind assigned to *such* would have to also be the kind of woman that we met yesterday. To get a better idea of what the external semantics of these *as*-phrases might be, I will at this point take a closer look at its internal semantics for clues.

For the internal semantics of these clauses, I will motivate the structure in (102), in which there is covert *wh*-movement internal to these relatives (I abstract away momentarily from the exact position from which the *wh*-operator moves, as indicated by the “to be further articulated” note; ultimately, I will posit the structure in (110) below):

(102) a. such women as there were at the party



That these *as*-relatives contain CPs that involve covert *wh*-movement is evidenced by examples that show that this movement is subject to island constraints. Compare for example, (103), (104), and (105): only in the latter, ungrammatical, examples would the *wh*-operator move out of an island.

(103) Such issues as John raised \_\_\_ at the meeting have been resurfacing for years.

(104) *Complex NP Island Constraint*

- a. \*Such issues as John made the claim that he raised \_\_\_ at the meeting have been resurfacing for years.
- b. \*Such issues as I know the person who claimed that he raised \_\_\_ at the meeting have been resurfacing for years.

(105) *Adjunct Island Constraint*

\*Such issues as John laughed when I raised \_\_\_ at the meeting have been resurfacing for years.

There is some evidence that the variable abstracted over in *as*-relatives ranges over kinds.<sup>41</sup> The argumentation here is in the spirit of Carlson (1977a, 1977b), and follows similar reasoning that has been presented for comparative clauses (see, e.g., Carlson 1977a and Heim 1987).<sup>42</sup> To begin with, the gap in a *such-as*-relative may follow *there be*:

(106) Such women as there were \_\_\_ at the party are a credit to society.

(Carlson 1977b)

These relatives are in this respect like comparatives (Carlson 1977b, Heim 1987 and others):

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<sup>41</sup> I believe that the same argument could be presented to show that the variable in *as*-relatives could also range over individuals.

<sup>42</sup> See also Section 4.2 below for a discussion of the interpretation of gaps following *there be*.

(107) More women than there were \_\_\_ at the party came to the show.

In contrast, restrictive relatives do not permit a gap following *there be*:<sup>43</sup>

(108) \*Women that there were \_\_\_ at the party came to the show.

Heim (1987), following Carlson, explains this as due to a constraint barring individual variables from the position following *there be* – an instance of the *Definiteness Restriction* of Milsark (1974, 1977):

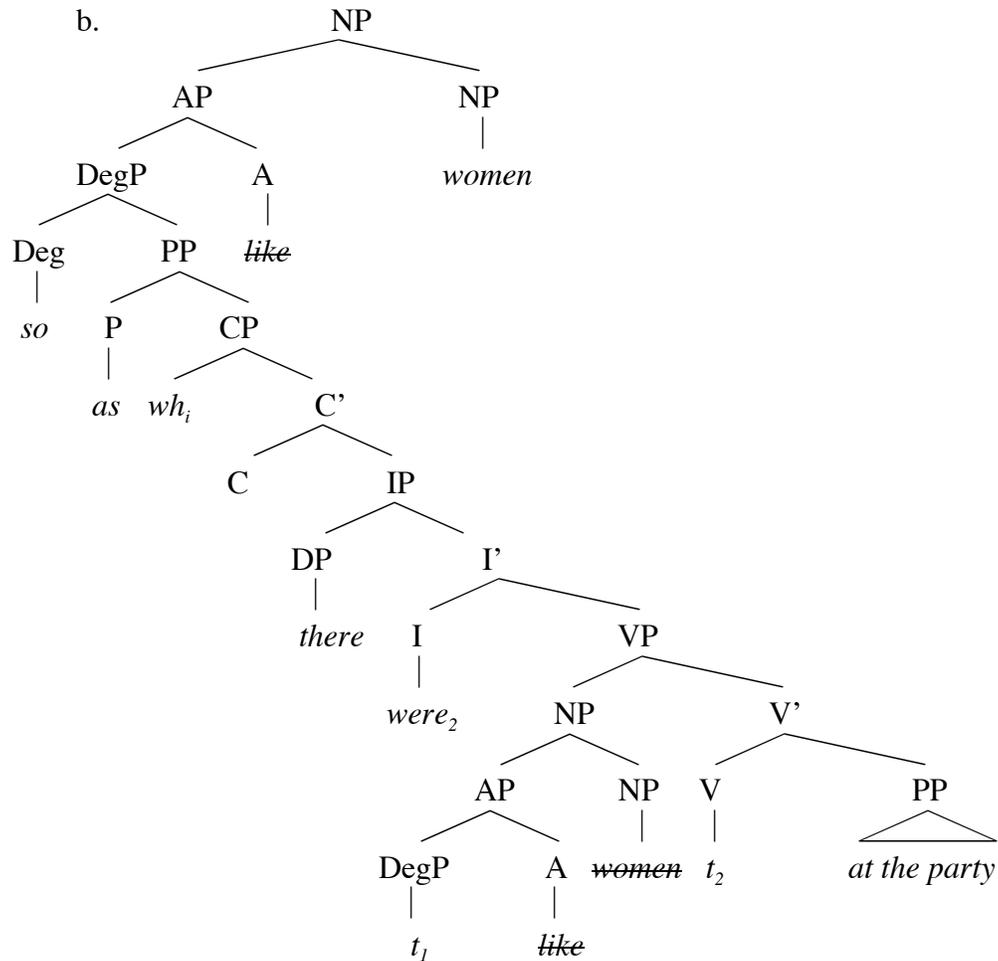
(109) \**There be x*, when *x* is an individual variable.

Assuming that individual variables cannot occupy the position following *there be*, (109) can be explained if *such as*-relatives involve a narrow scope occurrence of an indefinite of the form *k-like NP* in the position of the gap, with the *wh*-operator binding the kind variable, as in the LF posited in (110b). Note that in this structure, I have posited some unpronounced syntactic structure, in particular, deletion of *like* and *women*, which I will motivate shortly below following similar reasoning that has been presented for comparative clauses (see Carlson 1977a; Heim 1987, and others):

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<sup>43</sup> With the exception of *amount* or *kind* relatives (Carlson 1977a, Heim 1987, Grosu and Landman (1998), and others; see discussion of (163) below.

(110) a. such women as there were at the party



Similarly, *such-as*-relatives, unlike restrictive relatives, permit gaps in the position of predicate nominals:

(111) a. Such people as John believes those murderers are \_\_\_.

b. \*People that John believes those murderers are \_\_\_.

(based on Carlson 1977b)

The contrast between these examples is again explained if the gap in the *such-as*-relative is the indefinite *k-like people*, while the gap in the restrictive relative is an individual variable, assuming that predicate nominals are interpreted as predicates, and not individuals.

Further support for the LF in (102), and in particular treating *so* and the *such-as*-relative as forming a constituent, comes from the behavior of these relatives with respect to Antecedent Contained Deletion (ACD); the reasoning here again follows that proposed for comparatives, in particular, that of Wold (1995) and Heim (2000). *Such-as*-relatives allow ACD when modifying a weak nominal, but not when modifying a strong nominal:<sup>44</sup>

(112) *Weak nominals*:

- a. I never had such problems as you do.
- b. Ruben read such books as David did
- c. John climbed such trees as Bill did.
- d. I considered several such solutions as you did.

(113) *Strong nominals*:

- a. #I have every such problem as you do.
- b. #Ruben read most such books as David did.
- c. #John was climbing every such tree as Bill was.
- d. #I considered every such solution as you did.

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<sup>44</sup> Thanks to Uli Sauerland for suggesting I look at ACD in these clauses.

Interestingly, this is the opposite of the pattern observed for *that*-relative clauses, where only strongly quantified noun phrases may move (Carlson 1977a, Diesing 1992):

(114) I read every/each/most books that you did.

(115) \*I read few/two/∅ books that you did.

Diesing (1992) explains the contrast between (114) and (115) by assuming that ACD is resolved by Quantifier Raising, and that only strongly quantified noun phrases QR (Diesing 1992). But this does not explain the reversed ACD pattern for *such as*-relatives. To account for the good ACD cases with *such as* relatives (where the head of the relative is weak), a story can be told which mirrors the story Wold (1995) tells for similar data with comparatives (for a more recent variant of this analysis, see Bhatt and Pancheva 2004). Carlson (1977a) and Diesing (1992) had noted that ACD is possible in comparatives even if the head noun is weak (example based on Heim 2000):

(116) John was climbing more trees than Bill was.

Wold (1995) showed that cases like (116) can be explained by QR-ing the DegP, assuming that the DegP is a generalized quantifier over degrees (that is, the DegP must move to resolve a type mismatch). The DegP containing the elided VP thus moves out of the antecedent VP, and, in effect, the elided VP has an (appropriately) identical antecedent for ellipsis. The weak nominal stays in VP, and gets existentially closed:

(117) [<sub>DegP</sub> -er than [<sub>CP</sub> wh<sub>1</sub> Bill was ~~climbing d<sub>1</sub>-many trees~~]] I John was climbing d<sub>1</sub>-  
~~many trees~~

The whole structure then gets interpreted as follows:

(118)  $\|[\text{DegP } \text{-er than } [\text{CP } wh_1 \text{ Bill was climbing } d_1\text{-many trees}]] \text{ I John was climbing } d_1\text{-many trees}\|^g$  is true iff the number of trees that John was climbing is greater than the number of trees that Bill was climbing

Wold's argument can be straightforwardly used to explain the grammatical ACD cases in *such-as*-relatives. What moves is not the whole DP, but the DegP that contains the elided VP, so that, e.g., the LF for (119a) would be that in (119b).

(119) a. John was climbing such trees as Bill was.  
 b. [<sub>DegP</sub> so [<sub>PP</sub> as [<sub>CP</sub> wh<sub>1</sub> Bill was [<sub>VP</sub> ~~climbing k<sub>1</sub>-like trees~~]]] I John was [<sub>VP</sub> climbing k<sub>1</sub>-like trees]

To interpret this structure, *so* can here be taken to denote (the schoenfinkelized functional equivalent of) a relation between sets of kinds:

(120)  $\|so\|^g = \lambda f_{\langle k, t \rangle} . [ \lambda g_{\langle k, t \rangle} . \text{there is a kind } k \text{ such that } f(k) = 1 \text{ and } g(k) = 1 ]$

The *so* of *such* as a result would be treated here as ambiguous between a deictic, referential interpretation, in which case it refers to a kind or object, and a quantificational interpretation, in which case it denotes a relation between sets of kinds. In this way, *so* seems to act very much the Degree word *as*, which also appears to have a deictic, referential use, e.g., *He is as tall*, and a quantificational use, e.g., *He is as tall as Jane*. Given (120), *John was climbing such trees as Bill was* is predicted to be true iff there is some *k* such that John and Bill were climbing trees of kind *k*:

- (121)  $\| [_{DegP} \textit{so} [_{PP} \textit{as} [_{CP} \textit{wh}_1 \textit{I Bill was} [_{VP} \textit{climbing } k_1 \textit{-like trees}]]] \textit{I John was} [_{VP} \textit{climbing } k_1 \textit{-like trees}]] \|^\text{g} = 1$  iff there is a *k* such that John was climbing trees of kind *k* and Bill was climbing trees of kind *k*



quantificational DegP cannot move out of a quantificational DP, and ungrammaticality results (Ora Mathushanksy and Chris Kennedy, p.c.).<sup>45</sup>

Having spelled out a semantics for the *such-as*-clause, a parallel semantics can now be posited for *such-as* phrases.

### 2.2.5 *Such-as*-Phrases

*Such-as*-phrases occur in examples like the following, in which only a DP follows *as*:

(123) Such women as Frieda are a credit to society.

It is difficult to determine the semantics of these *as*-phrases, as there seems to be more than one way to analyze them, and it is hard to argue for one account over the other. There are some clues, however, and I will at least sketch an account here.

It will be useful to first address an ambiguity that may arise with these phrases when they occur post-nominally. Consider, for example, the sentences in (123), which illustrate two, truth-conditionally non-equivalent uses of post-nominal *such-as*-phrases.

- (124) a. Cats, such as yours, have no hair.  
b. Cats such as yours have no hair.

---

<sup>45</sup> Given this explanation, it would be predicted that *such-as*-relatives could never modify DP's headed by strong determiners, a prediction that appears to be borne out:

- (i) a. ??Sam appreciates most such comments as Maria gives.  
b. ??\*Most such examples as you presented were marginal.

In (124a), the *such-as*-phrase is an appositive, in which case an intonational break precedes and follows it. This contrasts with (124b), where it is a restrictive modifier, in which case there is no intonational break. The examples are not truth-conditionally equivalent: in a situation in which your cat has no hair, the first could be judged false, while the second would be judged true. I will only be concerned with the latter, restrictive use of *as*-phrases here; note that this restrictive use seems to be the only one available when *such* precedes the modified nominal, so that the following seems to be truth-conditionally equivalent to (124b):

(125) Such cats as yours have no hair.

The semantic contribution of the *as*-phrase appears to be that of helping fix the kind associated with *such*, which would otherwise be supplied by the context. The *as*-phrase, then, can be construed as a restriction on the contextually salient kind. Accordingly, I will take the *as*-phrase as a property of kinds, which the kind associated with *such* must satisfy.<sup>46</sup> This property appears to be constructed from the DP object of *as*, which itself does *not* appear to denote a kind, but rather an individual that instantiates (or exemplifies) a contextually salient kind (Carlson 1977b). Consider, for example, the following:

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<sup>46</sup> Alternatively, *as*-phrases might be taken to denote definite descriptions of kinds. See the following footnote for a more spelled out version of this possibility. I have chosen the above analysis instead of this one rather arbitrarily, since I do not see at this point strong evidence for one analysis over the other.

(126) Such men as Bill/those men/my friends/?several of my friends/?all my friends/\*some people/\*lots of Africans/\*everybody

(Carlson 1977b)

As Carlson puts it, “it seems the less easy it is to take the NP as picking out some particular person or set of persons that the speaker could have in mind as examples, the less acceptable the NP.”[p. 391]. This would also explain the following contrast (repeated from above), which again show that the DP object of *as* should instantiate the kind associated with *such*:

- (127) a. \*I want to read such books as you.  
 b. I want to read such books as those.  
 c. I want to read such books as you suggested.

These examples can be accounted for if *as* is taken to map an individual to a set of kinds that that object instantiates:<sup>47</sup>

(128)  $\|as\|^g = \lambda x . [ \lambda k : x \leq k ]$

---

<sup>47</sup> More precisely, *as* could be taken as a function from individuals to kinds:

- (i)  $\|as\|^g = \lambda x : \text{there is a unique salient kind in the context such that } x \leq k .$   
 the unique salient kind in the context such that  $x \leq k$ .

Here also, it would be a question how exactly *such* would combine with the *as*-phrase. One option would be to give *such* an extra argument:

- (ii)  $\|such\|^g = \lambda k . [ \lambda x . x \leq k ]$

Given (128), the *as*-phrase as a whole will then denote a set of kinds:

$$(129) \quad \llbracket as\ Mary \rrbracket^g = \lambda k . Mary \leq k$$

The question at this point is how the *as*-phrase semantically combines with *such*. One option is to treat the *as*-phrase as providing a restriction on the contextually salient kind assigned to *such*, so that the result of combining the two would be, e.g.:<sup>48</sup>

$$(130) \quad \llbracket such\ as\ Mary \rrbracket^g = \lambda x . x \leq k \text{ and } Mary \leq k$$

This property could then itself combine with an NP property, so that, e.g., (131a) would be interpreted as in (131b).

(131) a. such women as Mary

$$b. \quad \llbracket [_{DegP} \text{ such } as_i \text{ Mary}] \text{ women} \rrbracket = \lambda x . \text{women}(x) \text{ and } x \leq \text{the unique salient } k \\ \text{such that } Mary \leq k$$

### 2.2.6 Summary

Support for the hypothesis that *such* is associated with an individual variable comes from two points: (i) possible antecedents for *such* need to be kind-denoting or kind-instantiating, and (ii) the behavior of *such-as*-relatives is analogous to that of compara-

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<sup>48</sup> I do not see an elegant way of getting this result, but again giving *such* an extra argument would do the trick:

(i)  $\llbracket such \rrbracket^g = \lambda f_{\langle k, t \rangle} . [\lambda x . x \leq k \text{ and } f(k) = 1]$

tives – which arguably involve abstraction over *degrees* – in permitting a gap after *there be*, as well as allowing ACD in weakly modified nominals. Both of these properties can be accounted for by analyzing the gap in *as*-relatives as an indefinite containing a variable over kinds, viz., *k-like NP*. The analysis of *such* presented here thus both supports NHTV, and provides an account of the parallels between degree and kind morphology.

### 2.2.7 Restrictions on Co-occurring Determiners

I will conclude this study of *such* with some comments on the restrictions *such* imposes on the types of determiners with which it may co-occur. *Such* may not co-occur with a definite determiner unless *one*, *only*, or *first* immediately follow the definite determiner, as the examples in (132) illustrate:

- (132) a. \*the/those/John’s such ideas  
 b. the only/first/one such idea

*Such* also blocks specific readings of singular indefinites, for example, (a) is ambiguous between a specific and non-specific reading of the indefinite, while (b) permits only a non-specific reading.

- (133) a. I didn’t see a spot on the floor. *specific and nonspecific*  
 b. I didn’t see such a spot on the floor. *nonspecific only*

Interestingly, the ban on definites occurring with *such* also appears to hold in German and Spanish (and potentially Irish, Jim McCloskey, p.c.). It thus appears that definite determiners cannot semantically combine (at least directly) with nominals modified by *such*. It seems related to this puzzle that singular indefinites with *such* seem to be lacking specific readings. While I am not at all sure why the specific readings are absent here, I suspect that it related to the fact that the definite determiners cannot co-occur with *such*, either.

### **2.3 Like that**

*Such*, on its kind use, is of a formal register; in more informal conversation it could be naturally paraphrased with the expression *like that*. For example, (134b) would be a natural informal paraphrase of (134a).

- (134) a. I have such toothbrushes.  
b. I have toothbrushes like that.

Similarly, *such as*-phrases may be paraphrased with corresponding *like*-phrases:

- (135) a. I have toothbrushes such as his.  
b. I have toothbrushes like his.

There are even counterparts to the *such as*-relative:

(136) Such women as we met yesterday are a credit to society.

(137) Women like we met yesterday are a credit to society.

The similarity in use of *such* and *like that* raises the question of what the semantic connection is between the two, and, in particular, whether *like that* is also associated with an individual variable, or rather, a property variable. I will argue here for the former, and posit an interpretation for *like* which parallels quite closely the semantics proposed above for *such*.

### 2.3.1 Syntax of *Like That*

The syntax of *like* is hard to peg. On the one hand, *like* patterns like an adjective, as it may occur with degree morphology:

- (138) a. She is really like that.  
b. She is more like that than you are.

However, unlike an adjective, and like a preposition, *very* may not modify *like* without the presence of *much*.<sup>49</sup>

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<sup>49</sup> Predicate nominals also require the presence of *much* with *very*:

- (i) a. She is sometimes very much a fool.  
b. \*She is sometimes very a fool.

- (139) a. She is too/so/very much like that.  
b. She is very interested.  
c. She is very much below you.

Also unlike an adjective, but like a preposition, *like* may take a DP complement:

- (140) a. She is like that.  
b. \*She is interested that.  
c. She is below you.

These sorts of facts make it hard to tell what syntactic category *like* belongs to. Keeping these examples in mind, I will go ahead and assume *like* is an adjective here, for concreteness.

### 2.3.2 Semantics of *Like That*

Given the semantics of *such*, it seems natural to ask whether *like that* also involves anaphora to a kind. One way of testing this is to use Carlson's diagnostic for *such*: Can *like that* refer back to an antecedent that is not kind-denoting? The following sentences suggest that it cannot:

- (141) a. *People in the next room...??people like that*  
b. *Elephants that are standing there...??elephants like that*  
c. *Men that Jan fired this morning...??men like that*

It is again important to stress here that these examples are judged unacceptable *only* if *like that* takes as antecedent the preceding italicized bare plural, and not some contextually salient kind. For example, if (141a) were uttered in a context where people in the next room were loud, this example would be felicitous if *like that* meant *loud people*, and not *people in the next room*. The important point is that *like that* requires a contextually salient kind as its antecedent; it cannot modify *people* to pick out the set of people who are in the next room.

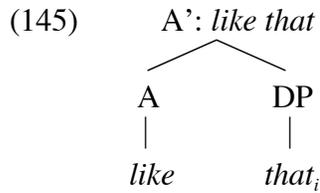
(142) I don't like the people in the next room. People like that are obnoxious.

Based on these examples, *like that* can be taken to be the semantic composition of *like* – a relation between kinds and individuals, as in (143) – and *that*, a variable that ranges over kinds, as in (144).

(143)  $\|like\| = \lambda k . [\lambda x . x \leq k]$

(144)  $\|that\|^s = g(i)$

Assuming the syntax in (145), *like* and *that* would then combine semantically, yielding a semantics identical to that of *such*, as in (146).



(146)  $\|\textit{like that}_i\|^g = \lambda x . x \leq g(i)$

As with *such*, however, there is also a use of *like* by which it combines with an expression that denotes an object. Examples like (147) suggest that *like* takes as its first argument an individual that exemplifies a kind – just as Carlson observed with *as* in (126) above, repeated below.

(147) People like you/Bill/him are hard to please.

These examples instead suggest that *like* may take as its first argument an object that instantiates a kind:

(148)  $\|\textit{like}\| = \lambda x . [\lambda y . \text{there is a salient kind } k \text{ such that } x \leq k \text{ and } y \leq k]$

According to this semantics, *like* relates two individuals that both instantiate a salient kind.

Interestingly, *like that* appears to impose the same restrictions as *such* does on the kinds of determiners with which it may co-occur. For example, nominals modified by *like that* are degraded when headed by a definite determiner, as (149a) shows, unless *one*, *only*, or *first* immediately follow the definite determiner, as (149b) shows.

- (149) a. ?the/that/his solution like that  
 b. the only/one/first solution like that

Likewise, specific readings of singular indefinites again seem to be absent, as was the case with *such*:

- (150) a. Paul didn't see a spot. *specific or non-specific*  
 b. Paul didn't see a spot like that. *non-specific only*

While I do not have an explanation for this pattern, the similarity in behavior to *such* does suggest that assigning them a parallel semantics is on the right track.

### 2.3.3 Like-Relatives

*Like*-relatives, as illustrated in (151), are the informal counterpart of the *as*-relative, as illustrated in (152):

- (151) Women like we met yesterday are a credit to society.  
 (152) Such women as we met yesterday are a credit to society.

In this section, I will present evidence that the variable abstracted over in these relatives, as in *as*-relatives, ranges over individuals.

These relatives give rise to ambiguity when modifying an object NP, and so, before going further, I will try to make clear which readings I will be looking at, and which

I will be setting aside. Consider, for example, (153), which is three-ways-ambiguous between what I will call a conjunctive reading, a manner reading, and a kind reading:

- (153) She buys toothbrushes like you do.
- a. She buys toothbrushes, and you buy toothbrushes. *conjunctive*
  - b. She buys toothbrushes how you buy toothbrushes. *manner*
  - c. She buys toothbrushes like the ones that you buy. *kind*

I will only be concerned with the kind reading in this section; the manner reading will be discussed in 2.5 below, and the conjunctive reading I will set aside completely. That the three readings are truly distinct is suggested by the fact that they are to some extent in complementary distribution.<sup>50</sup> In particular, only the kind reading is available when the *like*-relative occupies a position reserved for nominal modifiers; similarly, only the manner and conjunctive readings are available when the *like*-relative occurs in a position in which only verbal modifiers may occur. For example, only the kind reading is available when the *like*-relative modifies a subject nominal:

- (154) a. More women like we met at the party should be running this country.  
b. It's women like we met at the party that should be running this country.

The kind reading is also the only reading available when there is no VP Ellipsis in the *like*-relative:

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<sup>50</sup> Thanks to Marcin Morzycki (p.c.) and Kyle Rawlins (p.c.) for pressing me to show that the kind and manner readings are distinct (they remain skeptical.)

- (155) She buys toothbrushes like you buy \_\_\_\_.  
cf. She buys toothbrushes like you do.

In contrast, when *like*-relatives occur in positions that nominal modifiers *may not* occur, only the *manner* and *conjunctive* readings are possible. For example, the kind reading is not available when these relatives immediately follow the particle (of a particle verb) as in (156a), as compared to (156b), which is ambiguous:

- (156) a. I messed several solutions up like you did.  
b. I messed up several solutions like you did.

This is expected if rightward movement of the particle makes it impossible for the *like*-relative to modify the nominal *several solutions*. I will thus assume that the kind and manner readings are distinct.

Turning now to their internal structure, there is some evidence that *like*-relatives are in fact elliptical, so that, for example, (157) corresponds to the LF in (158), in which *the kind/one(s)* is elided:

- (157) theories like you presented  
(158) theories like ~~the kind/one(s)~~ [*wh<sub>i</sub>* that you presented *t<sub>i</sub>*]

Evidence for this is as follows: A unique property of restrictive *that*-relatives is that they generally disallow a subject from being relativized if the complementizer *that* is not overt, as the following contrast shows.

- (159) a. The guys [*wh* <sub>1</sub> *that* *t*<sub>1</sub> live next door] are hard to talk to.  
b. \*The guys [*wh* <sub>1</sub> *t*<sub>1</sub> live next door] are hard to talk to.

*Like*-relative show the same pattern, as it is ungrammatical for the subject of a *like*-relative to be relativized:

- (160) \*Guys like [*wh*<sub>1</sub> *t*<sub>1</sub> live next door] are hard to talk to.  
cf. Guys like you know are hard to talk to.

Based on these examples, I will assume henceforth that *like*-relatives are elided versions of their nominal paraphrases, as reflected by the LF in (158) above.

Like *as*-relatives, the gap in a *like*-relative may follow *there be*:

- (161) a. More women like there were at the party should run for office.  
b. He wants more toys like the ones that there were at the store.

This suggests that the gap in a *like*-relative corresponds to a weak indefinite:

- (162) like ~~the women~~ [<sub>CP</sub> *wh*<sub>1</sub> there were *k*<sub>1</sub>-like women at the party]

This makes these relatives look very much like *amount relatives* (see Chapter 4), which also permit relativization following *there-be*:

(163) The women that there were at the party couldn't have filled a bathtub.

They especially look like amount relatives if, as I am proposing, these relatives are derived from structures in which they contain restrictive relative clauses, allowing for paraphrases like the following:

- (164) a. More women like the ones there were at the party should run for office.  
b. He wants more toys like the ones that there were at the store.

Further, like *such-as*-relatives and comparative clauses, they permit ACD when modifying a weak nominal, but not when modifying a strong nominal:

(165) *Weak nominals*

- a. I never had problems like you do.  
b. Ruben read several books like David did.  
c. John climbed trees like Bill did.  
d. I considered several solutions like you did.

(166) *Strong nominals*

- a. #I have every problem like you do.
- b. #Ruben read most books like David did.
- c. #John was climbing every tree like Bill was.
- d. #I considered every solution like you did.

Here also, it appears *like*-relatives may be categorically bad with strong determiners, with or without ACD:

- (167) a. ?\*I've considered every solution like you suggested, and none seems to work.  
b. ?\*Most examples like you came up with were marginal.

Again, this is the opposite of the pattern observed for *that*-relative clauses (Carlson 1977a, Diesing 1992):

- (168) a. I read every/each/most books that you did.  
b. I read few/two books that you did.

This raises the question as to whether the analysis of *as*-relatives should be extended to *like*-relatives, so that ACD is in this case also resolved by movement. This would be a natural step, having adopting the analysis above for *as*-relatives, as in (169).

(169) a. John saw men like Bill did.

b.  $\llbracket_{AP} \textit{like the ones wh}_1 \textit{ that Bill did see } k_i \textit{-like men} \rrbracket \mid \textit{John saw } k_i \textit{-like men} \rrbracket$

However, there is not much independent evidence for this movement, however, and perhaps these cases of ACD should be handled differently, or perhaps they might lead to abandoning the movement analysis of ACD altogether. I will leave this for future investigation. In any case, *like*-relatives appear to behave just like *such-as*-relatives with respect to the *definiteness effect* and ACD.

### 2.3.4 Summary

In this section, I have argued that *like that* has a semantics very parallel to *such*: like *such*, *like that* may only be anteceded by nominals that denote properties that correspond to kinds, or objects that instantiate kinds, and its relatives (i.e., *like*-relatives) behave like they abstract over kinds with respect to the definiteness effect and ACD. These properties may be accounted for if *like* varies over individuals, either kinds, or objects that instantiate kinds.

### 2.4 Pro-AdvPs: *Tak* and *So*<sup>51</sup>

Alongside pro-forms that have the distribution of adjectives, there are also pro-forms that have the distribution of AdvPs. For instance, the adverbial *thus*, repeated from (170) above, appears to have the distribution of an adverb, and to pick up the reference of a preceding adverb:

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<sup>51</sup> This material in this section is based in large part on Landman and Morzycki (2003); I am very grateful to Marcin Morzycki for first pointing out the link between *such* and these adverbials, and for inspiring and insightful discussion of this material.

(170) You have to dance this dance with a definite sense of pride and haughtiness<sub>i</sub>, and if danced thus/so<sub>i</sub>, the dance will be beautiful. *AdvP*

Landman and Morzycki (2003, henceforth, LM) observe that in some languages, there is a close correspondence between adverbials analogous to English *thus*, and adnominal modifiers analogous to English *such*. As adverbials, these expressions seem to be anaphoric to a manner (see also Kehler and Ward 1999 for a similar adverbial use of *so* in English):<sup>52</sup>

(171) a. *Polish*

On tańczył tak.

he danced so

‘He danced like that.’

b. *German*

Er hat so getanzt.

He has so danced

‘He danced like that.’

As adnominals, these expressions are analogous to English *such*:

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<sup>52</sup> Thanks to Ania Łubowicz and Marcin Morzycki for the Polish data, and to Jan Anderssen for the German data.

(172) a. *Polish*

Taki pies uciekł wczoraj w nocy.

such dog ran.away yesterday in night

‘Such a dog ran away last night.’

b. *German*

So ein Hund ist letzte Nacht davongelaufen.

so a dog is last night away-ran.

‘Such a dog ran away last night.’

As LM point out, these adverbial and adnominal expressions are closely related: they share the same morphological form (minus inflectional morphology in Polish), and both are anaphoric. Further, as with English *such*, they may occur with optional *as*-phrases. (173) illustrates this for the adnominal cases, and (174) for the adverbials.

(173) a. *Polish*

Taki pies jak ten uciekł wczoraj w nocy.

such dog as this ran.away yesterday in night

‘Such a dog as this ran away last night.’

b. *German*

So ein Hund wie dieser hat mal meinen Brudergebissen.

so a dog as this has once my brother bitten.

‘Such a dog as this once bit my brother.’

(174) a. *Polish*

Jan tańczył tak jak Maria.

John danced so as Mary

‘John danced how Mary did.’

b. *German*

Jan hat so wie Maria getanzt.

John has thus as Mary danced

‘John danced how Mary did.’

In Polish, the correspondence between adnominal and adverbial uses is also reflected in the *wh*-word counterparts of *tak/taki*:

(175) a. Jaki pies uciekł wczoraj w nocy?

what dog ran.away yesterday in night

‘What kind of dog ran away last night?’

b. Jak tańczył Jan?

how danced John

‘How did John dance?’

These modifiers, then, share several properties: they are both anaphoric, both take *as*-phrases, and, in Polish, have parallel *wh*-words.<sup>53</sup>

LM capture the relation between the adnominal and adverbial uses by analyzing these modifiers as uniformly kind-anaphoric. As in English, the adnominal cases may be construed as anaphoric to a kind.<sup>54</sup>

(176) a.  $\|taki_i\|^g = [\lambda x . x \leq g(i)]$

b.  $\|so_i\|^g = [\lambda x . x \leq g(i)]$

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<sup>53</sup> A similar pattern appears to occur in in Macedonian (Slavica Kochovska 2004), Korean (Seunghun Lee 2004) and Chinese (Wei Li 2004).

<sup>54</sup> For *taki* and *so*, there is no justification for positing an abstract internal structure, as for *such*, which I analyzed as the combination of *so* and *like*. Accordingly, I assume here that these expressions are assigned this semantics, and have no internal structure analogous to *such*.

Extending this analysis to the adverbial uses, these too can be taken to be properties of realizations of a contextually salient kind, in this case, a contextually supplied *event-kind* (on event-kinds, see also Hinrichs 1985 and Barwise and Perry 1983):

$$(177) \quad \|\text{tak}_i\|^g = [\lambda e . e \leq g(i)]$$

These modifiers then would combine with the verbs they modify by predicate modification:

$$(178) \quad \|\text{tańczył tak}_i\|^g = [\lambda e . \text{dance}(e) \ \& \ e \leq g(i)]$$

German *so* and Polish *tak* can thus be uniformly analyzed as kind-anaphoric in both their adnominal and adverbial uses, with ‘manner’ modeled as an event-kind.

This analysis raises the question of what exactly the linguistic antecedents for *tak* and *so* are – what expression, if any, corresponds to an event-kind – and whether they are subject to similar restrictions as were observed for *such*. There are some clues for determining the linguistic antecedents for these expressions. For example, Marcin Morzycki (p.c.) points out that examples like the following suggest that manner adverbs – as opposed to full VPs – antecede these adverbials, as indicated by the underlining:

(179) Maria ist auf einem Bein gehüpft und Jan stand so herum.

Maria has on one foot hopped and Jan stood so around

‘Maria hopped on one foot, and Jan stood around like that.’

If *so* were instead assigned the reference of the entire preceding VP, *ist auf einem Bein gehüpft*, the wrong result would obtain, as the sentence does not assert that Jan has done any standing.

Other restrictions on possible antecedents for these expressions also can be observed: Neither temporal nor locative adverbials may (generally) antecede these adverbials, as the examples in (180) illustrate.

(180) a. *German*

\*Maria hat am Dienstag getanzt und Jan hat auch so getanzt.

Maria has on Tuesday danced and Jan has also so danced

‘Maria dance on Tuesday, and Jan danced like that too.’

b. *Polish*

\*Maria tańczyła we wtorek i Jan też tak tańczył.

Maria danced on Tuesday and Jan also so danced

‘\*Maria danced on Tuesday, and Jan danced like that too.’

(181) a. *German*

\*Maria hat in Minnesota gegessen und Jan hat auch so gegessen.

Maria has in Minnesota eaten and Jan has also so eaten

‘\*Maria ate in Minnesota, and Jan ate like that too.’

b. *Polish*

\*Maria jadła w Minnesocie i Jan też tak jadł.

Maria ate in Minnesota and Jan also so ate

‘\*Maria ate in Minnesota, and Jan ate like that too.’

Temporal and locative adverbials in general restrict a set of events to having taken place at a particular time or place in a given world, and as a consequence may not make for a very good event-kind, similar to the restrictions observed for *such*.

However, as both Chris Potts (p.c.) and Mark Baker (p.c.) have pointed out, this restriction may just be due to the fact that there are other lexical items available in these languages as pro-forms for temporal or locative adverbials, analogous to English *then* and *there*, respectively. The existence of these words plausibly then blocks the use of *so* and *tak* in these cases. It remains unclear, then, what expressions may serve as the linguistic antecedents of these adverbials, and whether they are restricted in the same way that the antecedents for *such* are restricted. There are at least two plausible antecedents: (i) a preceding manner adverb, e.g., *clumsily*; and (ii) a whole VP, e.g., *dancing clumsily* (a third possibility, even, is that both of these expressions are possible as antecedents, as dis-

cussed in 2.5). I will return to the issue of what may antecede *so* in the discussion of *do so* below.

## 2.5 Adverbial *Like That*

This account of adverbial *tak* and *so* can be straightforwardly be extended to adverbial *like that*, illustrated in (182).

(182) He walks like that.

Here, on analogy with adnominal *like that*, the *like* of adverbial *like that* relates an event kind and an individual, as in (183), and *that* in this case is interpreted as a variable ranging over event-kinds, as in (184):

(183)  $\|likell = \lambda k . [\lambda e . e \leq k]$

(184)  $\|that\|^g = g(i)$

Combining these two semantically yields a semantics equivalent to that proposed above for *tak* and *so*, repeated as follows:

(185) a.  $\|taki_i\|^g = [\lambda x . x \leq g(i)]$

b.  $\|so_i\|^g = [\lambda x . x \leq g(i)]$

It should be noted here, however, that something more would need to be said for examples like *he walks like her*, where *her* does not obviously instantiate an event-kind. This makes for an interesting contrast with the adnominal *people like her*, where *her* must instantiate the contextually supplied kind.

Much about the syntax and semantics of *like* remains unresolved. I have here tried to show that a line of thought that treats it as anaphoric to a kind seems to account for its parallels to *such* and its adverbial analogues.

## 2.6 The VP Pro-form *Do So*

With this analysis of *such* and its adverbial counterparts in hand, it is appealing to consider English *do so* as another instance of kind-anaphora, taking *do so* as the semantic composition of main verb *do* and the adverbial *so* (Bouton 1970, building on Ross 1972; see also Kehler and Ward 1999). In this section, I will sketch an analysis according to which the English adverbial *so* that occurs in *do so* is interpreted just like German *so* (and Polish *tak*): as a set of events that instantiate a variable over event-kinds.<sup>55</sup>

There are several ways in which *do so* behaves as if it is the combination of main verb *do* and adverbial *so*. For one, syntactically, the *do* of *do so* behaves like a main verb, as it cannot invert (186), does not escape VP-deletion (187), and cannot occur in tags (188).

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<sup>55</sup> Thanks in particular to Chris Potts (p.c.) and Marcin Morzycki (p.c.) for discussion of extending the analysis of *tak* and *so* to English *do so*.

- (186) a. You did so.  
b. Did you do so?  
c. \*Did you so?

- (187) a. You did.  
b. \*Did you do?  
c. Did you?

In addition, *do so* does not passivize or undergo clefting, suggesting that it is adverbial (Kehler and Ward 1999):

- (188) \*...and so was done by Hillary. (Kehler and Ward 1999)  
(189) \*It is so which Hillary did.  
(190) \*What Hillary did was so.

Further support for treating *do so* as the combination of main verb *do* and adverbial *so* comes from data that show that main verb *do* and *do so* share certain semantic properties (Ross 1972). As Ross observes, main verb *do* independently occurs in the grammar, in examples like the following:

- (191) Jack did a study of bat guano. (Ross 1972)  
 a report on marshmallows  
 research on hedonism  
 a dive from the south bulwark  
 some snark-hunting

This verb, Ross observes, must take as its complement a nominal that appears to denote an activity:

- (192) \*Jack did knowledge of karate.

Like main verb *do*, *do so* requires a non-stative antecedent (Lakoff and Ross 1976):

- (193) \*The coffee *is cold*, but it didn't use to *do so*.

This would be explained if these pro-forms inherited this condition from main verb *do*, which can be taken to introduce agentivity (Rajesh Bhatt, p.c.):

- (194)  $\ll do \gg = \lambda x . [\lambda e . \text{Agent}(e)=x]$

Taking the *so* of *do so* to have the same semantics as German *so* and Polish *tak*, namely, a property of individuals that instantiate an event-kind, as in (195), *do so* can then be in-

terpreted as the semantic composition of *do* and *so*, a set of events that instantiate a contextually salient kind of event, as in (196).

(195)  $\llbracket so_i \rrbracket^g = \lambda e . e \leq g(i)$

(196)  $\llbracket do\ so_i \rrbracket^g = \lambda x . [\lambda e . Agent(e)=x \ \& \ e \leq g(i)]$

To illustrate the analysis, the instance of *do so* in (197a) would be interpreted as in (197b), assuming that  $g(i)$  yields the event kind DANCE.

(197) a. Mary danced<sub>i</sub> and John did so<sub>i</sub>, too.

b.  $\llbracket do\ so_i \rrbracket^g = \lambda x . [\lambda e . Agent(e)=x \ \text{and} \ e \leq \text{DANCE}]$

There are some difficulties, though, for this type of account, as *do so* is less restricted than German *so* in the types of antecedents it may take. For example, *so* in German requires a manner as antecedent, as (198) shows, whereas *do so* does not, as (199) shows.

(198) *German*

Maria hat \*(elegant und schnell) getanzt und Peter hat auch so getanzt.

Maria has elegantly and quickly danced and Peter has also so danced

‘Maria danced \*(elegantly and quickly), and Peter danced like that too.’

(199) Mary *danced* and John *did so*, too.

Further, *so* may not have a temporal or locative antecedent, as the examples in (200) show, while *do so* may, as (201) shows:

(200) a. *German*

\*Maria hat am Dienstag getanzt und Jan hat auch so getanzt.

Maria has on Tuesday danced and Jan has also so danced

‘Maria dance on Tuesday, and Jan danced like that too.’

b. *German*

\*Maria hat in Minnesota gegessen und Jan hat auch so gegessen.

Maria has in Minnesota eaten and Jan has also so eaten

‘\*Maria ate in Minnesota, and Jan ate like that too.’

(201) a. *Maria danced on Tuesday, and Jan did so too.*

b. *Maria ate in Minnesota, and Jan did so too.*

In light of these facts, R. Schwarzschild and S. Cumming (p.c.) suggest an account that in part resolves the issue of what types of linguistic expressions correspond to event-kinds. I am unsure how the account would be formalized, but an intuitive description of it runs as follows. They suggest that both manner adverbs as well as whole VPs may provide the antecedent for adverbial *so*, and accordingly, both may denote (or at least introduce into the discourse) event-kinds. *So*, then, may take one or the other as its antecedent; and which it takes as antecedent is sometimes forced by the semantic environment in which it

occurs. For example, in (199) and (201), the *so* in *do so* takes as its reference event-kinds introduced by the preceding italicized VPs. In contrast, in examples when *so* modifies a verb other than *do*, it picks up the reference of a preceding adverbial alone. This pattern might be explained if every VP may correspond to no more than one core-VP-meaning, and, main verb *do* is ‘semantically light’ in not introducing such a meaning. Thus, when *so* combines with *do*, it takes as its antecedent (an event-kind associated with) a whole VP-meaning, whereas, when it occurs with a verb other than *do*, it may only be anteceded by an adverbial.

## 2.7 Predicative *So*

There are also examples in which *so* make substitute for an AP, as in the following example (repeated from (9) above):

(202) I thought she would be happy<sub>i</sub>, but she certainly doesn’t seem so<sub>i</sub>. *AP*

Although I will not treat predicative *so* in detail here, I will sketch an account of this expression, according to which it too is construed as related to *such*. That is, I will extend the analysis of adverbial *so* to the predicative AP *so*.

First, note that predicative AP *so* also occurs in German:

(203) Er sagte dass er sich schlecht fühle, aber er sah nicht so aus.

He said that he himself bad felt, but he looked not so AUS.

“He said that he felt bad, but he didn’t look so.”

The fact that predicative AP *so* and adverbial *so* in German are morphologically the same supports treating them as having the same semantics.

Further, some evidence for interpreting AP *so* in English in the same way as English adverbial *so* comes from the observation that in English, AP *so* seems to have the same distribution as the phrase *that way*, suggesting a correspondence between *so* and manner adverbials:

(204) I thought she would be happy, but she certainly doesn’t seem so.

(205) I thought she would be happy, but she certainly doesn’t seem that way.

(206) ??That made Julia happy, and it made Frank that way too.

(207) ??That made Julia happy, and it made Frank so too.

This use of *so* certainly requires further investigation, but these examples suggest that it too may be part of the same paradigm, so that all of these cases involve anaphora to kinds, or objects that instantiate kinds.

## 2.8 Chapter Summary

Having looked at several plausible candidates for property-anaphors in English, it appears that there is no strong evidence for treating them in this way. Instead, these seem to be a class of pro-forms related to *such*, all of which vary over individuals that are, or instantiate, kinds.

## CHAPTER 3

### MOVEMENT AND VARIABLES

#### 3.1 Introduction

The constraint I am proposing, NHTV, has implications for just those cases of movement that involve abstraction over variables at LF.<sup>56,57</sup> In particular, the constraint predicts only a restricted set of such movement constructions to occur, namely, only those that involve binding of individual variables. I will argue in this chapter that if we look at the types of variables that may be abstracted over in A'-movement constructions at LF, NHTV in fact explains what does and does *not* occur. Data will come exclusively from English.

To illustrate that some movement constructions have been analyzed as involving bound variables at LF, consider the restrictive relative clause construction, as illustrated by the italicized string in (208) (the semantic analysis I will adopt here is based on Quine 1960, Montague 1974, and Partee 1975).

(208) I liked the movie *that Lara made* \_\_\_.

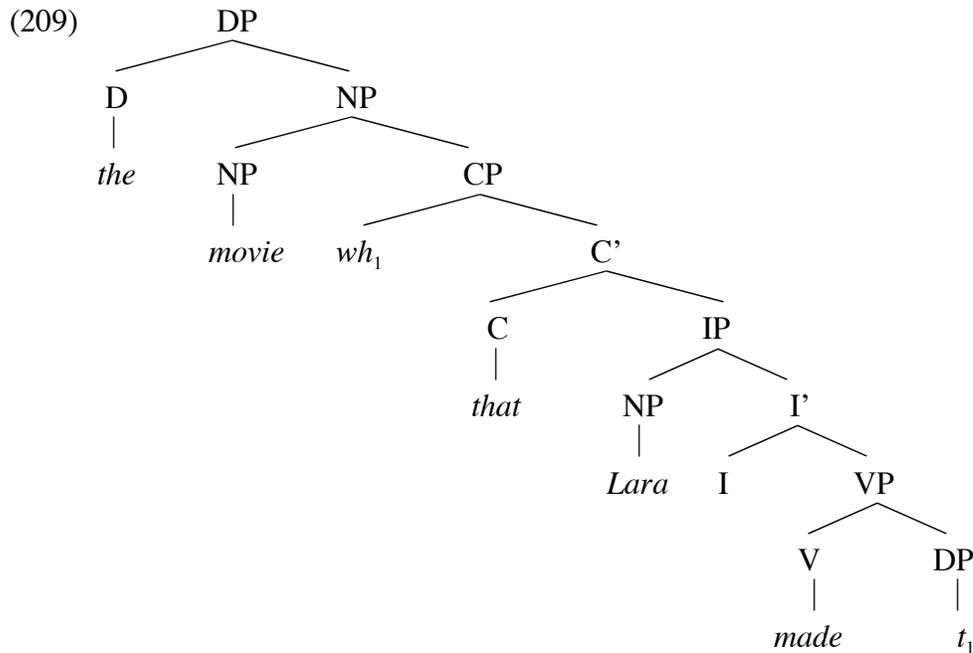
I will adopt a syntactic analysis of restrictive relatives according to which they involve *wh*-movement (Chomsky 1977), so that (208) is represented at LF by the structure in (209), in which a non-overt *wh*-element occupies the Specifier of CP, and a variable oc-

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<sup>56</sup> I will only look at instances of A'-movement in this work, and will have to leave for future research other cases of movement that may involve variables, e.g., A-movement constructions such as Raising.

<sup>57</sup> In some frameworks, movement constructions do not involve bound variables at LF – as in a variable-free semantics, for example. Under such frameworks, the constraint would not have any bearing on what types of movement constructions were possible or impossible. See Section 4.5 for further discussion.

curs in its original position – that is, in the position of the *surface gap*, the position following *made* in (208), represented here as an indexed trace.<sup>58</sup>



Like a pronoun, the indexed trace receives its value from the assignment function – that is, it is a variable. Further, this variable is bound at the CP level by the moved *wh*-operator, which introduces lambda abstraction, given the Predicate Abstraction rule given in Chapter 1. In effect, the relative clause CP is interpreted as in (210): it is a function that maps an individual  $x$  to true iff Lara made  $x$ .

$$(210) \quad \llbracket [_{CP} wh_1 \text{ that } Lara \text{ made } t_1] \rrbracket^g = \lambda x . Lara \text{ made } x$$

<sup>58</sup> In (209), I represent the variable syntactically as an indexed trace. However, this is in part for ease of exposition, as committing to a theory in which gaps are represented as *traces* at LF is not essential to my arguments for NHTV; what *is* essential in (209) is that the gap is treated semantically as a *variable*.

In this way, (at least some) restrictive relative clauses – and *wh*-constructions more generally – have been analyzed as involving bound variables at LF.

I will motivate NHTV by looking at – and for – potential cases of movement constructions in which higher-type variables might be posited, and showing that there is evidence that higher-type variables do not in fact occur. Empirical evidence for this position will come in two forms. First, higher-type variables have been posited to account for cases of *reconstruction*; I will review arguments that have been presented against such accounts based on binding theory constraints. Second, I will show that NHTV correctly predicts the absence of certain constructions that would require higher-type variables at LF. In particular, I will look for cases in which the gap in an *A'*-construction corresponds syntactically to a predicative phrase (AP, VP, or AdvP), as these are potential cases in which higher-type variables might occur. Following work on movement constructions by several authors, I will argue that many cases of movement of higher-type expressions are in fact instances of partial or total *syntactic* reconstruction. In the case of partial reconstruction, what is bound at LF is not a higher-type variable, but rather an individual variable (as in *wh*-questions such as *How tall is she?*). In the case of total reconstruction, there is no variable binding at LF at all (as in topicalization structures such as *She said she would win the election, and win the election, she did*).

The remainder of this chapter is organized as follows. In Section 3.2, I will review arguments that partial reconstruction is necessary for (at least some) cases of pied-piping. In Section 3.3, I will review two possible analyses of reconstruction, namely, syntactic and semantic reconstruction, the latter of which appeals to higher-type variables. I will in this section review arguments against semantic reconstruction. The discussion of recon-

struction will pave the way for looking at gaps in A'-constructions that appear to correspond syntactically to higher-type expressions, such as VPs and APs, which are the focus of Section 3.4: in this section, I will look at (and for) A'-constructions that have gaps with the syntactic distribution of higher-type expressions: topicalization structures in 3.4.1, and *wh*-movement in 3.4.2. In Section 3.5, I will briefly discuss variable-free semantic frameworks. Section 3.6 concludes the chapter.

### 3.2 Reconstruction and Pied-piping

*Reconstruction* refers generally to cases where a moved constituent – or a part thereof – behaves as if it were interpreted in its unmoved position. *Pied-piping* in *wh*-questions, for example, has been observed to behave this way (Chomsky 1977, Karttunen 1977, Heim 1987, among others). Consider, for example, the contrast in grammaticality between the following two *wh*-questions, both of which at least superficially look quite alike, in that both have gaps that correspond syntactically to a DP, and both of have gaps in the post-copular position of a *there*-existential (these examples are based on Heim 1987, who in turn reports the contrast from Safir 1982):<sup>59</sup>

- (211) a. [<sub>CP</sub> How many soldiers] were there \_\_\_ at the party (when you got there)?  
b. ??[<sub>CP</sub> Who] was there \_\_\_ at the party (when you got there)?

Heim (1987) shows the contrast in (211) can be explained given independently motivated assumptions about both (i) what may occur in the post-copular subject position of a *there*-

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<sup>59</sup> The discussion here will follow in large part the discussion of these examples in Heim 1987.

existential – a position known to be subject to the *Definiteness Restriction* (Milsark 1974, 1977) – and (ii) how the gap in each of these examples should be interpreted in order to derive the right interpretations for these questions. Starting with (i), Milsark’s Definiteness Restriction bars certain nominals – his *strong* nominals, which include the definite nominals – from occurring in the post-copular subject position of *there*-existentials, to account for the contrast in (212).

- (212) a. \*There was the soldier at the party.  
b. There was a soldier at the party.

Heim posits as an instance of the Definiteness Restriction the constraint in (213), which prohibits individual variables from occupying the position following *there-be*, taking individual variables to belong to the strong class of nominals.

- (213) \**There be x*, where *x* is an individual variable. (Heim 1987)

Support for (213) comes examples like the following, which show that a bound variable pronoun may not occur following *there be*:

- (214) a. \*Few people admitted that there had been them at the party.  
b. \*No perfect relationship is such that there is it.

Further support for (213) comes from the distribution of *wh*-gaps in *there*-existentials. In particular, if (213) holds, it predicts that a gap that is interpreted as an individual variable should *not* be permitted in the post-copular position of a *there*-existential. Heim proposes that this in fact accounts for the contrast in (211), repeated below.

- (211) a. How many soldiers were there \_\_\_ at the party (when you got there)?  
 b. ??Who was there \_\_\_ at the party (when you got there)?

It can be independently argued based on the semantics of these questions that the gap in (211a) is not solely an individual variable at LF, while the one in (211b) is. For example, the meaning of (211a) corresponds (roughly) to the paraphrase in (215a): the question asks, for what degree *d*, whether there were *d*-many soldiers at the party. This meaning can be derived by (roughly) the LF representation in (215b), in which the *how many*-phrase is taken to comprise two parts, the first consisting of a *wh*-operator (contributed by *how*) and the second *x-many N'*, construed here as a existential generalized quantifier which is pied-piped with *how* in the surface structure representation (Heim 1987, Cresti 1995, Rullmann 1995, Romero 1998, Frampton 1999, Fox 1999.)<sup>60</sup>

- (215) a. For what degree *d*: there were *d*-many soldiers at the party.  
 b.  $Wh_d$  [there were *d*-many soldiers at the party]

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<sup>60</sup> For the present discussion, I will assume without argument that this interpretation is derived from an LF in which the indefinite *x-many people* syntactically occupies its base position, either by being lowered (Cinque 1990) or by interpreting its lowest copy (Chomsky 1995). That is, I will assume that part of the *how many*-phrase is *syntactically reconstructed* into its unmoved position (Heim 1987, Lebeaux 1990, Heycock 1995, Romero 1999, Fox 2000 and others). I will, however, motivate this assumption, and compare it to *semantic* theories of reconstruction in the next section (Section 2.4).

Importantly, in order to derive this interpretation, (211a) is interpreted with a narrow scope occurrence of *x-many soldiers*. As Heim points out, if *x-many soldiers* were *not* interpreted with narrow-scope with respect to the *wh*-operator, as in (216b), the sentence would receive the unwanted interpretation in (216a), which could be answered by, e.g., Tom, Bill, and Frank, which intuitively is not an appropriate answer to (211a).

- (216) a. For what  $y$  such that there is a degree  $d$  and  $y$  is  $d$ -many soldiers:  
           there was  $y$  at the party
- b.  $Wh_y [\exists d [d\text{-many soldiers}(y)]]$  [there were  $y$  at the party]

This explains the well-formedness of (211a), as the gap in this question is not represented as an individual variable at LF, and thus does not violate the Definiteness Restriction. (211a) in this way contrasts with the interpretation of *who* questions like that in (211b), repeated below, which arguably do have a gap that corresponds to an individual variable at LF. The result is that (211b) would be assigned an interpretation like that in (217), in which *who* is represented as *for what person  $x$* .<sup>61</sup>

- (211) b. ?Who was there \_\_\_ at the party (when you got there)?
- (217)  $Wh_x: x$  is a person: there was  $x$  at the party

In (217), an individual variable follows *there be*, which results in ungrammaticality.

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<sup>61</sup> Heim (1987) suggests that *who* in some instances may also be interpreted in a way similar to *how-many*, and in this case satisfies the Definiteness Restriction. The reader is referred to that work for details.

To summarize, a surface gap arguably is not always interpreted as an individual variable at LF, although it may *contain* one. For example, although *how-many-N*-questions and *who* questions both have DP gaps, they differ with respect to the LF representations of their gaps. For the former, material that is pied-piped in the surface string – i.e., *x-many-N* – is interpreted at LF in the position of the gap. For the latter, an individual variable occupies the position of the gap. This explains why a gap corresponding to a moved *how-many-N* phrase may occur in the post-copular subject position of a *there*-existential, while a gap corresponding to a moved *who* phrase may not, assuming Heim’s *there be x* constraint in (213).

In this section, I have assumed without argument that these examples are accounted for by syntactic reconstruction. There is, however, an alternative account of these cases that makes use of higher-type variables to capture the same contrasts, namely *semantic reconstruction*. In the next section, I will introduce this alternative, and present arguments that have been given against it, and in favor of syntactic reconstruction.

### 3.3 Syntactic vs. Semantic Reconstruction

Several analyses have been proposed to account for reconstructed phrases; I will discuss two competing accounts here, namely, syntactic reconstruction, and semantic reconstruction. Recall from the previous section that *how many*-questions provide an example of *partial reconstruction*, in that part of the moved phrase is reconstructed in the position of the gap at LF, so that (218a) is assigned an LF like that in (218b).<sup>62</sup>

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<sup>62</sup> I follow Elbourne and Sauerland (2002) is using the terms *partial reconstruction* for a partially reconstructed expression, and *total reconstruction* (a term they attribute to Aoun and Benmamoun 1998) for a totally reconstructed expression. My account of reconstruction, however, differs from their own.

(218) *Syntactic reconstruction*

- a. How many soldiers were there \_\_\_ at the party?
- b.  $Wh_d$ : there were d-many soldiers at the party.

As reflected in (218b), one way of achieving a narrow-scope interpretation of part of the *how-many* phrase is to assume that the indefinite *d-many people* syntactically occupies the position of the gap that is, the indefinite is *syntactically reconstructed* (Heim 1987, Lebeaux 1990, Heycock 1995, Romero 1998, Fox 1999, 2000, among others), either by being lowered (Cinque 1990) or by interpreting its lowest *copy* (Chomsky 1995). However, there is an alternative – and semantically equivalent – way of achieving this narrow-scope interpretation, according to which no material is syntactically reconstructed in the position of the gap at LF. Instead, the desired interpretation can also be achieved by assigning to the surface gap a higher-type variable at LF; this account is referred to as *semantic reconstruction* (Engdahl 1986, Chierchia 1995, Cresti 1995, Rullman 1995, Romero 1998, Sternefeld 1997, 2001, Sharvit 1997). By this account, representing the surface gap at LF with a variable of the same type as the expression *x-many-soldiers* – here, type  $\langle\langle e, t \rangle, t \rangle$  – makes it possible to interpret this constituent as if it occupied that position syntactically. For example, interpreting the gap in (219a) as a variable of type  $\langle\langle e, t \rangle, t \rangle$ , as in (219b), produces the same semantic result as syntactically reconstructing *x-many soldiers* in its base position:

(219) *Semantic reconstruction*

- a. How many soldiers were there \_\_\_ at the party?
- b.  $Wh_d$  [*d-many soldiers* [ $\lambda f_{\langle\langle e,t\rangle,t\rangle}$ . there were  $f_{\langle\langle e,t\rangle,t\rangle}$  at the party]]

By abstracting over a variable of the same type as *d-many soldiers*, the constituent is interpreted as if it were in its base position.

Authors have since debated about whether there is any evidence for syntactic versus semantic reconstruction. In particular, evidence from sensitivity to LF constraints – binding theory constraints, in particular, assuming that these are structural constraints that hold at LF – have been used to determine the LF position of a reconstructed phrase (Lebeaux 1991, Heycock 1995, Sportiche 1996, 2001, Romero 1998, Fox 1999, 2000 and others).<sup>63</sup> For example, consider the following contrast (based on Romero 1998):<sup>64</sup>

- (220) a. \*[How many pictures of John<sub>i</sub>] did he<sub>i</sub> buy \_\_\_?
- b. [How many pictures of himself<sub>i</sub>] did John<sub>i</sub> buy \_\_\_?

Given the surface syntactic configurations of these examples, these judgments are surprising given the definitions of Principles C and A in (221) and (222).

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<sup>63</sup> Alternative accounts of binding phenomena have been proposed, in particular that of Reinhart (1983), which does not depend on structural configurations. Sharvit (1999) and Sternefeld (2001) in fact argue that the contrasts presented here may be accounted for on a semantic reconstruction account, given this construal of binding (namely, a preference for variable binding over coreference).

<sup>64</sup> The lack Principle A violations in the examples at hand may be the result of the reflexives being logophoric, and thus not subject to Principle A (as Heycock 1995 points out, based on Reinhart and Reuland 1993). If so, then these examples would not provide support for syntactic reconstruction. See, however, Fox and Nissebaum 2004 for evidence (not presented here) that Principle A can in fact be used to motivate syntactic reconstruction.

(221) *Principle C*: An r-expression cannot be c-commanded by a co-referring expression.

(222) *Principle A*: An anaphor must be c-commanded by its binder.

For example, the surface syntax of (220a) does not violate Principle C, as *John*, an r-expression, is not c-commanded by the co-referential *he* (and thus this example would need to be ruled out on other grounds). Similarly, the surface syntax of (220b) does not satisfy Principle A, as *himself* is not c-commanded by its binder, *John*. These peculiar judgments can, however, be explained if the pied-piped portion of the moved *how-many* phrase – in this case, *x-many pictures* – is syntactically reconstructed at LF:

- (223) a.  $Wh_x$  [ $he_1$  bought  $x$ -many pictures of  $John_1$ ]  
b.  $Wh_x$  [ $John_1$  bought  $x$ -many pictures of  $himself_1$ ]

In these examples, Principles C and A are satisfied, respectively. In effect, these examples behave like their declarative counterparts (substituting *that* for *how*):

- (224) a. \* $He_1$  bought that many pictures of  $John_1$ .  
b.  $John_1$  bought that many pictures of  $himself_1$ .

(224a), like (223a), violates Principle C, while (224b), like (223b), satisfies Principle A.

A similar contrast comes from variable binding examples, as in (225) (thanks to Henry Davis, p.c., for bringing these examples to my attention).

- (225) a. \*[How many pictures of [each woman]<sub>1</sub> ] did she<sub>1</sub> buy?  
b. [How many pictures of herself<sub>1</sub>] did [each woman]<sub>1</sub> buy?

Assuming that a variable binder must c-command variables it binds at LF, these grammaticality judgments are expected if these questions are assigned the LFs in (226), in which the *x-many N* constituent is syntactically reconstructed:

- (226) a.  $Wh_x$  [she<sub>1</sub> bought *x-many* pictures of [each woman]<sub>1</sub> ]  
b.  $Wh_x$  [[each woman]<sub>1</sub> bought *x-many* pictures of herself<sub>1</sub> ]

In (226a), *each woman* does not c-command *she*, while in (226b), it does.

To sum up so far, Principles C and A – assuming that these principles are structural constraints that hold at LF – provide evidence for syntactic reconstruction for *how-many* questions, and against semantic reconstruction. I will adopt this account of reconstruction here, and thus do not see *how-many* questions as posing a counterexample to NHTV.

In addition to *how-many*-questions, other constructions have also been analyzed as instances of reconstruction. Interestingly, based on Principle C effects, several authors have argued that just those expressions that would require higher-type traces to semantically reconstruct in fact obligatorily syntactically reconstruct at LF (see Heycock 1995, Fox 1999; based on data from Cinque 1990; see also Beck 1996 in the context of *how*

*many* questions). In the next section, I will consider other cases of reconstruction in the context of non-nominal gaps.

### 3.4 Non-Nominal Gaps in A'-Constructions

I turn now to motivation that NHTV holds for A'-Movement. My main strategy will be to look for gaps in A'-constructions that correspond to higher-type expressions, in particular, VPs, APs, and AdvPs. These present potential cases in which higher-type variables would be used to interpret the gaps in these structures. In Section 3.4.1, I will look at topicalization, and in Section 3.4.2, at *wh*-movement.

#### 3.4.1 Topicalization

Gaps corresponding to both VPs and APs may occur in topicalization structures, as (227) illustrates.

- (227) a. ...and [<sub>VP</sub> win the election], Terry did \_\_. *VP*  
b. ...and [<sub>AP</sub> angry], Martha became \_\_. *AP*

These structures, like *how-many* questions, have been analyzed as cases of reconstruction, and here too, both syntactic and semantic reconstruction have been proposed. By the former account, the gaps in these structures may be syntactically reconstructed at LF, as in (228) (see Cinque 1984, Barss 1986, 1987, Huang 1993, Heycock 1995).

- (228) a. Terry did [<sub>VP</sub> win the election]  
 b. Martha became [<sub>AP</sub> angry]

The alternative is to construct an LF in which the gap is interpreted as a variable of the same type as the moved constituents, with the result that they are interpreted as if in their unmoved position (see von Stechow 1991, Bittner 1994).<sup>65</sup>

- (229) a. [<sub>VP</sub> win the election] [  $\lambda f_{\langle e, t \rangle} . \text{Terry did } f_{\langle e, t \rangle} ]$   
 b. [<sub>AP</sub> angry] [  $\lambda f_{\langle e, t \rangle} . \text{Martha became } f_{\langle e, t \rangle} ]$

Note that this case differs from the *how-many* cases discussed in the previous section in that here the *whole* constituent is reconstructed in its original position, that is, these are instances of *total reconstruction*; I flag this here because it will be relevant below for looking at *wh*-questions with predicative gaps, where total reconstruction is not possible (see discussion below).

Based on Principle C effects, several authors have argued that topicalized predicates obligatorily *syntactically* reconstruct at LF (Cinque 1984; Barss 1986, 1988; Huang

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<sup>65</sup> A third possibility is that these constructions involve abstraction over a nominalized individual, as suggested in Potts (2002b), so that (i) is assigned the LF in (ii):

- (i) Win the election, Terry did \_\_\_\_.  
 (ii) [<sub>VP</sub> Win the election] 1 Terry did  $t_1$ .

By this account, the moved VP would denote a nominalized property, and the variable abstracted over would range over nominalized properties. Potts supports this account with the observation that moved predicates may extract out of weak islands:

- (iii) Win the election, Terry wondered whether he would \_\_\_\_.

If only individual-denoting phrases may extract, then this example can be taken as evidence for the LF in (ii). See further discussion in Section 3.4.3.

1993; Heycock 1995). Assuming that Principle C is a syntactic condition holding at LF, the constraint has been used to determine the LF position of the moved predicate (Lebeaux 1990, Heycock 1995, and others). Consider, for example, the following contrast:

(230) [<sub>DP</sub> Those allegations about John<sub>i</sub>], I think he<sub>i</sub> will deny \_\_\_.

(231) \*<sub>[VP</sub> Cry out for Mary<sub>i</sub>'s brother], I think she<sub>i</sub> did \_\_\_.

In both of these examples, a phrase that contains an R-expression is moved out of a configuration in which Principle C would be violated, as examples in which these phrases are not moved illustrate:

(232) \*I think he<sub>i</sub> will deny [<sub>DP</sub> those allegations about John<sub>i</sub>].

(233) \*I think she<sub>i</sub> [<sub>VP</sub> cried out for Mary<sub>i</sub>'s brother].

The contrast between the sentences in (230) and those in (231), can be explained if moved APs and VPs – that is, moved predicates – obligatorily reconstruct at LF. As (233) shows, this would result in a Principle C violation. In contrast, in (230), the moved constituent leaves an individual trace, and thus may be interpreted in its moved position, where it does not violate Principle C. Just this state of affairs is predicted if higher-type traces are disallowed, as NHTV dictates.

To summarize, evidence from Principle C suggests that topicalization structures are instances of *syntactic reconstruction*, and thus do not involve higher-type variables.

### 3.4.2 *Wh*-Movement

In this section, I will look at constructions in which *wh*-gaps correspond to expressions that are commonly taken to be of a higher-type, in particular, VPs, APs, and AdvPs. For each type of syntactic constituent, I will look at their behavior in three *wh*-constructions: *wh*-questions, restrictive relatives, and pseudo-clefts. I postpone looking at their behavior in non-restrictive relatives and *as*-appositives to Section 3.5.

#### 3.4.2.1 VP Gaps in *Wh*-Constructions

In English, *wh*-gaps with the distribution of VPs are not possible in *wh*-questions, pseudo-clefts, or restrictive relatives. Consider for example, the ungrammatical *wh*-question in (234b), which has a gap with the distribution of a VP, as comparison with (234a) shows.

- (234) a. I saw Mary [<sub>VP</sub> wash the dishes].  
b. \*What did you see Mary \_\_\_?  
c. What did you see Mary do \_\_\_?

The ungrammaticality of (234b) indicates that the gap in a *wh*-question cannot have the distribution of a full VP. Instead, to form a *wh*-question for a VP, examples like (234c) are used, which appears to be a nominal *wh*-phrase combined with main verb *do*, analogous to expressions like *do so* or *do that* discussed in Chapter 2. Similarly, VP gaps do not occur in pseudo-cleft constructions, as (234a) shows; instead, here too, (234b) is used, in which main verb *do* occurs with a nominal gap.

- (235) a. \*What I saw Mary \_\_\_ was wash the dishes.  
b. What I saw Mary do \_\_\_ was wash the dishes.

The situation is similar for restrictive relative clauses, in which VP gaps are also absent, as (236a) shows (however, see discussion immediately below on what such constructions might mean, and where they would occur in the syntax); (236a) contrasts with (236b), in which main verb *do* occurs.

- (236) a. \*<sub>[CP]</sub> *wh* that I made Mary \_\_\_ ]  
b. The typing <sub>[CP]</sub> *wh* that I made Mary do \_\_\_ ] was sloppy.

The absence of *wh*-questions and restrictive clauses with VP gaps can be explained by NHTV. Unlike with topicalization, total reconstruction for these examples is not possible: as Sauerland and Elbourne (2004) point out, total reconstruction for *wh*-questions is not possible because the *wh*-operator in these constructions would otherwise be a vacuous binder. Partial reconstruction is as a result required for *wh*-constructions (as opposed to topicalization, for example). Since these constructions require abstraction over a variable, and since VP meanings are usually taken to be properties of individuals, the result would be abstraction over properties. This, I am claiming, is the reason for the ungrammaticality of the (a) cases in (12)-(236) above. In order to avoid abstraction over higher-type variables, the form *do what* is used instead, which makes possible abstraction over individual variables – in particular, over variables that range over individuals that correspond to nominalized properties. Support for viewing the variable as ranging over individuals that

correspond to nominalized properties comes from the contrast between grammaticality of (236b) above, and the ungrammaticality of (237) below: the relative clause *that I saw her do* is grammatical *only* if it modifies a nominal property, e.g, in (236b). This relative clause *cannot* modify a verb, as (237) shows.<sup>66</sup>

(237) \*Mary typed [<sub>CP</sub> *wh* that I made her do \_\_\_].

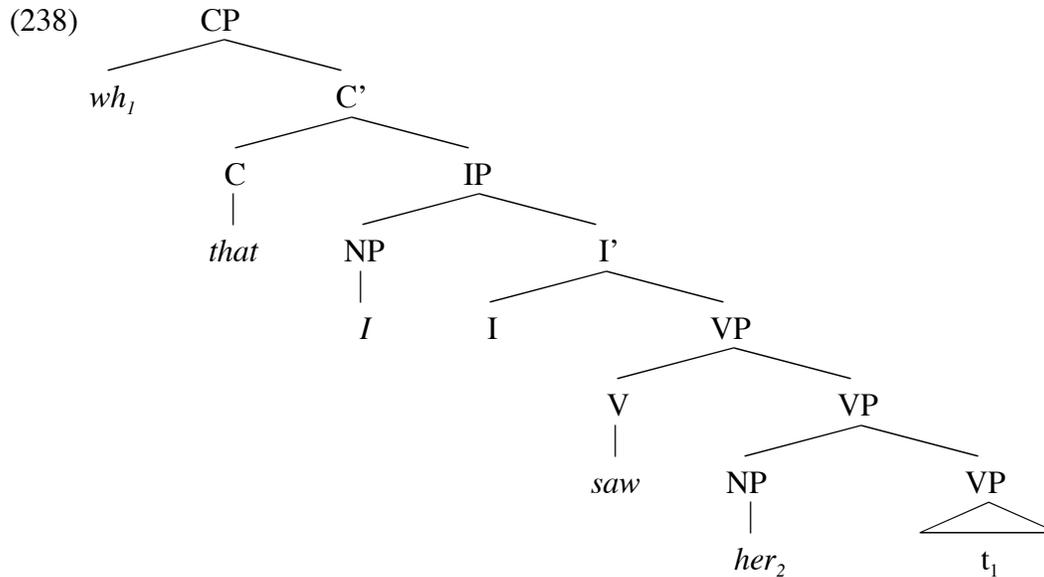
There is, apparently, a sortal clash in (237), as the CP denotes a set of nominalized individuals. This supports the conclusion that the variable in this construction is itself a variable over individuals that correspond to nominalized properties.

Returning to the hypothetical, but non-occurring case of a restrictive relative clause with a property-type gap, it is worth spelling out just what the semantics of such a constituent would be, if it were to exist. This can be illustrated by building up the semantics of this constituent step by step. Consider, for example, the LF fragment in (238), which has a VP gap:

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<sup>66</sup> There may independent factors that rule out VP relatives. Rajesh Bhatt (p.c.), for example, suggests that it may be the case that relative clauses must adjoin to NPs, and that this independently rules out examples like (237), repeated as (i) below.

(i) \*Mary typed [<sub>CP</sub> *wh* that I saw her do \_\_\_].



Construing the trace as a variable over properties would yield a denotation for the above tree as in (239), in which there is abstraction over a variable over verb meanings.

(239)  $[\lambda f_{\langle e, t \rangle} . \text{I saw Mary } f_{\langle e, t \rangle}]$

This property would be a highly-typed modifier: a set of sets, i.e., type  $\langle \langle e, t \rangle, t \rangle$ . This type of modifier would not be appropriate for an  $\langle e, t \rangle$ -type predicate, but rather would be fit for, e.g., a generalized quantifier, as it would provide a restriction on just this sort of expression, i.e., the characteristic function of a set of sets. This might very well explain in part why modifiers with VP gaps do not occur.

### 3.4.2.2 AP Gaps in *Wh*-Constructions

The situation with respect to AP gaps is a bit more complicated than that with VPs, so I will discuss each case in turn.

Starting with *wh*-questions, there are at least two types of AP gaps possible in English, as (240) and (241) illustrate.

- (240) a. Mary is that tall.  
b. How tall is Mary \_\_\_?

- (241) a. Mary looks sick.  
b. How does Mary look \_\_\_?

These questions differ in that first arguably is a case of pied-piping, and involves reconstruction – as was the case for *how many*-questions above – while the second is not. That the first involves reconstruction can be argued on similar grounds as was argued for *how many* questions. That is, the meaning of (240) may be paraphrased as in (242a), in which case it the question asks for a degree. It does not have the meaning in (242b), in which it asks for a predicate; if it did, we would expect that *about six-feet* would be an inappropriate answer to (240a), which it is not.

- (242) a. For what  $d$ : Mary is  $d$ -tall.  
b. For what  $f_{\langle e, t \rangle}$  such that there is a degree  $d$  and  $f$  is  $d$ -tall:  
Mary is  $f_{\langle e, t \rangle}$

To derive the interpretation in (242a), the question may be associated with the LF in (243), in which the pied-piped material, *d-tall*, is syntactically reconstructed in its original position, and what is abstracted over at LF is a degree argument.

(243)  $Wh_d$  [Mary is *d-tall*]

Given this LF, the question does not involve higher-type variables at LF: even though its gap corresponds syntactically to an AP, the variable bound at LF is one that ranges over degrees. It should be noted, however, in addition to (b), semantic reconstruction would produce the same interpretation:

(244)  $Wh_d$  [Mary is *d-tall*]

There is no evidence from Principle C in this case against semantic reconstruction, so although it is possible to show that (244) can be interpreted without appealing to higher-type variables, there is no evidence that semantic reconstruction is not an option in this case. To motivate syntactic reconstruction in this, one could perhaps just assume that these cases work like the *how-many* cases.

I turn now to the second type of AP question, as in (245), repeated below.

- (241) a. Mary looks sick.  
b. How does Mary look \_\_\_?

This case, unlike (241), does not ask for a degree, but rather a predicate. I want to propose, however, that the gap in these cases is not a predicate, but rather has the same semantics as that of the expression *that way*. I suggest this because there appears to be a correlation between the grammaticality of *that way*, and the possibility of an AP gap. Consider, for example, the following paradigm:

- (245) a. Mary looks sad.  
b. Mary looks that way.  
c. How does Mary look \_\_\_?
- (246) a. Mary feel sad.  
b. Mary feels that way.  
c. How does Mary feel \_\_\_?
- (247) a. Marc made Mary sad.  
b. ??Marc made Mary that way.  
c. ??How did Marc make Mary?
- (248) a. Marc found Mary drunk.  
b. Marc found Mary that way.  
c. How did Marc find Mary?

These data suggest that these *how* questions may be analyzed as adverbial questions, the *wh*-counterparts to the adverbial pro-form, *so*. As a consequence, *how*-questions involve abstraction over kinds, just as *so* ranges over kinds (see further discussion of the semantics of adverbial gaps in the next section). That AP gaps are not otherwise possible in *wh*-constructions is supported by their non-occurrence in restrictive relatives, as (249a) illustrates, and pseudoclefts, as (249b) illustrates.

- (249) a. \* $[_{CP} wh_i I \text{ made Mary } t_i]$   
 b. ?What I made Mary was angry.

As with VP gaps, the absence of *wh*-questions and restrictive clauses with AP gaps is expected given NHTV, since these constructions would require abstraction over AP meanings, usually taken to be properties of individuals.

### 3.4.2.3 Adverbial Gaps in *Wh*-Constructions

The ungrammaticality of AP and VP gaps is not obviously due to an alternative restriction that only syntactically *nominal* expressions may *wh*-move, as the *wh*-words *where*, *when*, and *how* in the *wh*-questions in (13) and free relatives in (14) are not obviously nominal, and yet are well-formed:

- (250) a. Where<sub>*i*</sub> did you put the keys \_\_\_?  
 b. When<sub>*i*</sub> did you arrive \_\_\_?  
 c. How<sub>*i*</sub> did you travel \_\_\_?

- (251) a. Matthew works [<sub>CP</sub> where<sub>i</sub> you work \_\_\_].  
 b. Matthew laughs [<sub>CP</sub> when<sub>i</sub> you laugh \_\_\_].  
 c. Matthew sings [<sub>CP</sub> how<sub>i</sub> you sing \_\_\_].

*Wh*-movement of these particular adverbials is possible because they produce structures in which there is abstraction over individuals: locations in (13a) and (14a), times in (13b) and (14b), and event-kinds (following Landman and Morzycki 2003) in (13c) and (14c).<sup>67</sup>

### 3.4.3 Non-Restrictive Relatives

Given that VP gaps are ungrammatical in *wh*-questions, restrictive relative clauses, and pseudo-clefts, it is somewhat surprising that they *do* occur in non-restrictive *which*-relatives (henceforth, *which*-relatives), as (252a) illustrates (Jespersen 1965, Sells 1985, Hardt 1993, 1999, Potts 2002a, 2002b); examples are based on Jespersen 1965, via Sells 1985). AP gaps may also occur in NRRs, as (252b) shows.<sup>68</sup>

(252) *Which-relatives*

- a. I can make words, which you cannot \_\_\_. VP  
 b. ?It made her feel sick, which it made me feel \_\_\_ too. AP

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<sup>67</sup> Lisa Matthewson (p.c.) asks what the status of *why* is. I believe that this case also may be taken to involve individuals, with *why* gaps varying over the same type of individual that expressions like *the reason* denotes.

<sup>68</sup> Stowell and Potts present examples like (i) below as cases of AP gaps; these examples seem better judged than those above, however, I have chosen these particular ones because it makes it clear that we are not dealing with VP gaps, assuming that the auxiliary *be* moves up to I.

(i) He is tired, which she [<sub>IP</sub> [<sub>I</sub> is] [<sub>VP</sub> \_\_\_]] too.

Similar examples are provided by *as*-appositives, which also permit VP and AP gaps, as (253) illustrates (examples based on Stowell 1987 and Potts 2002a, 2002b).

(253) *As-appositives*

- a. She seemed happy, just as Theobald did \_\_. VP
- b. ?It made her feel sick, as it made me feel \_\_ too. AP

The question that arises, then, is the following: why are VP (and AP) gaps permitted in non-restrictive relatives and *as*-appositives, but disallowed in *wh*-questions, *wh*-relatives, and clefts? Recall that in Section 3.4.2.1, I explained the absence of VP gaps in the latter three constructions as due to NHTV: such constructions necessarily involve *wh*-binding, and are ruled out because they would require higher-type variables, construing APs and VPs as properties. Given that VP and AP gaps are possible in *which*-relatives and *as*-appositives, then, it seems that one faces (at least) three possible explanations for these facts: (i) *which*-relatives and *as*-appositives do not involve movement, (ii) both *which*-relatives and *as*-appositives involve abstraction over individuals (contra Potts 2002a,b), or (iii) NHTV does not hold for movement constructions. I will suggest here that it is (ii) that explains the grammaticality of AP and VP gaps in *as*-appositives, that is, both of these constructions involve abstraction over individual variables. This is a departure from the analysis of Potts (2002a,b), who argues that *which*-relatives and *as*-appositives differ in the semantic type of their gaps, and so I will review his arguments for that position in the following, to make clear the consequences of departing from his analysis of these constructions. I will argue that his conclusion that these constructions

differ in the semantic types of their gaps is not a necessary one, given the data he presents.

As a first point, it should be established that *which*-relatives and *as*-appositives truly involve *wh*-movement, as one potential explanation for the difference in the behavior of these two constructions on the one hand, and *wh*-questions, restrictive relatives, and pseudo-clefts on the other, would be that the gaps in the former are not instances of *wh*-movement, but rather, ellipsis. Potts (2002a,b) – building on the work of Stowell (1987) – argues that they do, by showing that these constructions do not display properties of ellipsis, but do show properties of movement. More specifically, Potts (2002b), following Stowell (1987), takes the gaps in *as*-appositives and *which*-relatives to be produced by *wh*-movement, so that the *as*-appositive in (254a) is assigned the structure in (255b), in which a *wh* operator occupies the specifier of the CP complement of *as*, which is analyzed as a preposition, and the *which*-relative in (255a) is assigned the structure in (255b) (based on Potts 2002a), in which a *wh*-operator occupies the specifier of the CP:

(254) a. Ames stole important documents, as the FBI said he had \_\_\_ .

b. [<sub>PP</sub> [<sub>P</sub> *as*] [<sub>CP</sub> *wh*<sub>1</sub> *the FBI said he had t*<sub>1</sub>]]

(255) a. Ames stole important documents, which the FBI said he had \_\_\_ .

b. [<sub>CP</sub> *which*<sub>1</sub> *the FBI said he had t*<sub>1</sub>]

Potts supports this analysis by showing that although *as* may be separated from the gap by more than a single clause, as (256) shows (example based on Potts 2002b), *as* may *not*

be separated from the gap by a syntactic island (as I will show in the following paragraphs). He presents the examples in (257) - (260), which show that *as*-appositives are sensitive to island boundaries (Potts attributes the original observation to Ross 1973; see also McCloskey 1989, Lapointe 1991, Postal 1997). The (a) examples involve CP-*as*, the (b) examples Predicate-*As*:

- (256) a. James left early, just as I thought he might \_\_\_\_.  
b. James left early, which I thought he might \_\_\_\_.

(257) *Relative Clause Island*

- a. The earth is round, just as we (\*spoke with someone who) claimed \_\_\_\_.  
b. John left the country, just as we (\*know someone else who) will \_\_\_\_.

(258) *Adjunct Island*

- a. Jim sells cars, as (\*they smiled politely when) Bill announced \_\_\_\_ last night.  
b. Jim couldn't stop laughing, just as (\*they smiled politely when) Bill couldn't \_\_\_\_ last night.

(259) *Subject Island*

- a. \*The earth is round, just as his announcing \_\_\_\_ made everyone giggle.  
b. \*He sells cars, just as his announcing he does \_\_\_\_ made everyone giggle.

(260) *Complex DP Island*

- a. The earth is round, as (\*we made the claim that) everyone knows \_\_.
- b. He felt happy, as (\*we made the claim that) he should \_\_.

The same pattern holds for *which*-relatives, which also do not permit *which* to be separated from the gap by an island boundary:<sup>69</sup>

(261) *Relative Clause Island*

- a. The earth is round, which we (\*spoke with someone who) claimed \_\_.
- b. He left early, which we (\*saw someone who) did \_\_ too.

(262) *Adjunct Island*

- a. Jim sells cars, which (\*they smiled when) Bill announced \_\_ last night.
- b. Jim couldn't stop laughing, which (\*they smiled when) Bill couldn't \_\_ either.

(263) *Subject Island*

- a. The earth is round, which (\* his claiming) \_\_ made everyone giggle.
- b. He left early, which (\* his claiming we did) \_\_ made everyone giggle.

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<sup>69</sup> As Potts points out, additional evidence that *which*-relatives involve movement comes from examples like (i), which show that *which* may pied-pipe a preposition; this can be taken to be diagnostic of *wh*-movement (see also Stowell 1987):

- (i) a. The earth is round, which we are well are of \_\_.
- b. The earth is round, of which we are well aware \_\_.

(264) *Complex DP Island*

- a. The earth is round, which (\*we made the claim that) everyone knows \_\_\_.
- b. He felt happy, which (\*we made the claim that) he should \_\_\_ more often.

As Potts points out, island sensitivity makes these constructions unlike VP Ellipsis, which is *insensitive* to islands, as the examples in (265) - (268) illustrate; this supports the conclusion that the gaps in *as*-appositives and *which*-relatives are the product of movement.

(265) *Relative Clause Island*

John left the country, and we know someone else who will \_\_\_ too.

(266) *Adjunct Island*

Jim couldn't stop laughing, and they smiled when Bill couldn't \_\_\_ either.

(267) *Subject Island*

He left early, and his claiming we did \_\_\_ too made everyong giggle.

(268) *Complex DP Island*

He felt happy, and we made the claim that he should \_\_\_ more often.

In sum, both *which*-relatives and *as*-appositives – unlike ellipsis – obey island constraints, and this motivates the conclusion that there is *wh*-movement internal to these clauses.<sup>70</sup>

Having established that the gaps in these constructions are due to movement, I turn now to the interpretation of these gaps. Potts (2002a) argues that *which*-relatives have individual-denoting gaps, while *as*-appositives have higher-type gaps (I abstract away here from the external semantics of these constructions, which does not matter for my purposes here.)<sup>71</sup> Potts argues that treating the gaps in non-restrictive relatives as individual variables, and *as*-appositives as having higher-order variables accounts for certain differences in their behavior. I will ultimately conclude that this is not a necessary conclusion, however, given his arguments. He provides three arguments for this position, which I will review in turn.

First, Potts follows Stowell (1987) and Postal (1994), in claiming that the constructions differ in the syntactic type of their gaps. In particular, these authors show that the gap in a *which*-relatives has the distribution of a DP, while the gap in an *as*-appositive has the distribution of a CP. Evidence comes from examples which show that the gap in a *which*-relative may only occur where a DP can, and, similarly, the gap in an *as*-appositive may only occur where a CP can. For example, (269) shows that the gap in a *which*-

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<sup>70</sup> It should be noted, however, that German and Spanish, which do not permit VP ellipsis at all, also do not permit VP gaps in *which*-relatives and *as*-appositives, but instead only permit a VP pro-form. This suggests a possible correlation between the acceptability of VP ellipsis in a language, and the possibility of having VP gaps in non-restrictive clauses.

<sup>71</sup> Sells' (1985) analysis of *which*-relatives is similar to that of Potts (2002a,b) in that Sells analyzes *which* as a variable over *individuals*: by Sells' analysis, *which* is a pronoun just like the pronoun *it*, only it ranges over *nominalized properties* (Sells adopts Chierchia's (1984) proposal that VPs and APs may correspond to individuals, as well as properties.) Interestingly, Sells claims that the antecedents for *which* correspond to those syntactic categories that denote individuals, and he concludes that "...[*which*] anaphora gives us clues as to what individuals we should posit in our semantic representation" [p. 305].

relative behaves like a DP, in requiring the presence of *of* when occurring as the argument of the adjective *aware*.

- (269) a. We are well aware (\*of) that the earth is round.  
b. The earth is round, as we are well aware (\*of).  
d. \*The earth is round, of as we are well aware.

The gaps in *as*-appositives show the opposite behavior, as (270) shows: these examples show that the gap in an *as*-appositive may *not* occur with *of*.

- (270) a. We are well aware \*(of) the fact that the earth is round.  
b. The earth is round, which we are well aware \*(of).  
d. The earth is round, of which we are well aware.

The same pattern occurs with respect to the complement of verbs like *boast* and *comment* (Postal 1994), which do not allow DP complements, but instead require CP complements, as (271) shows.

- (271) a. \*Albert boasted/commented/complained that.  
b. Albert boasted/commented/complained that the results were fantastic.

Correspondingly, these verbs permit *as*-appositive gaps in their object position, but not *which*-relative gaps (Postal 1994):

- (272) a. ??The results were fantastic, which Albert boasted/commented/complained.  
 b. The results were fantastic, as Albert boasted/commented/complained.

Stowell (1987) also supports the contrast between *which*-relatives and *as*-appositives using raising verbs, which also take CP, but not DP complements, as the following examples show:

- (273) a. It appears (\*a fact) that the earth really is round.  
 b. The earth is round, {as/\*which} it appears.

Potts, assuming a close connection between syntactic category and semantic type, takes the difference in syntactic gap to indicate a difference in semantic type of the gaps. He proposes that *which*-relatives have individual-denoting variable, while *as*-appositives have gaps corresponding to propositions, construed as properties of worlds. He then extends this analysis to cases in which *which*-relatives have VP or AP gaps, as in (252), repeated from above. That is, the gaps in these examples, he claims, also are represented at LF as individual variables, in particular, individuals that correspond to nominalized properties.

(252) *Non-Restrictive Relatives*

- a. I can make words, which you cannot \_\_. *VP*  
 b. ?It made her feel sick, which it made me feel \_\_ too. *AP*

However, the conclusion is somewhat puzzling, given that there is no evidence for these cases that the gaps here are *syntactically* nominal. If anything, it seems that they are not, since nominals of course may not occur where a VP occurs:

(274) *Non-Restrictive Relatives*

- a. \*I can make words, and you cannot that. VP
- b. \*It made her feel sick, and it made me feel that too. AP

I conclude that the argument that syntactic category determines semantic type is not a particularly strong one here. Both *which*-relatives and *as*-appositives may be taken to involve abstraction over individuals.

The second argument Potts presents comes from the behavior of *as*-appositives and *which*-relatives with respect to extraction of out weak islands. The main observation is that the *wh*-operator in an *as*-appositive may not move out of a weak island, while *which* may (based on Ross 1984):

- (275) a. ?He was a spy, which they asked whether we knew \_\_.
- b. \*He was a spy, as they asked whether we knew \_\_.

Potts points out that this contrast can be explained given his assumptions about the semantic types of the gaps in these constructions, in conjunction with the assumption that only individual-level phrases may escape islands, as has been proposed by in work by Cinque (1990), Frampton (1991), and Cresti (1995). However, as Szabolcsi (1998, 2002)

discusses in detail, there are several types of data that are not amenable to the claim that only individual-level phrases may escape islands. Given that the status of the generalization is not clear at this time, I do not take the data in (275) as indicative of the semantic type of the gap in *which*-relatives and *as*-appositives.

To summarize, Potts argues that *which*-relatives have individual-denoting variables, while *as*-appositives have higher-order gaps, based on the syntactic distribution of their gaps, and the possibility of extraction out of weak islands. I am not convinced, however, that these arguments show conclusively that the gap in an *as*-appositive differs in semantic type from that of a *which*-clause, and in particular, that his arguments show that *as*-appositives necessarily have higher-order gaps.

However, as Potts (p.c.), points out, if these arguments do go through, one conclusion that might be made is that NHTV does not in fact hold for instances of movement. This would require a conception of movement according to which it does not involve variables. I will briefly discuss this possibility in the final section of this chapter.

### **3.5 Variable-Free Semantics**

In light of the behavior of non-restrictive relatives and *as*-parentheticals, one route to take would be to give up the assumption that movement structures are interpreted as involving abstraction over variables. This has been argued for in variable-free frameworks (Jacobson, Szabolcsi 1989, among others). Giving up the treatment of gaps as variables would be one way to account for the differences between *which*-relatives and *as*-appositives discussed in the previous section. By shifting the focus away from movement and binding, the constraint would fall to free variables or their equivalents in a variable-free system. It

would then be possible to say that NHTV is actually about what kinds of context dependency we find in natural language.

Taking this route, however, would also mean giving up any explanation of why VP and AP gaps are not possible in certain *wh*-constructions (as argued in Section 3.4.2), as NHTV would not apply to movement constructions. Further, it would mean giving up what appears to be the same constraint applying to both movement, as well as pro-forms (namely, NHTV).

### **3.6 Chapter Summary**

According to NHTV, gaps produced by movement involve variables of a type no higher than that of an individual. I have argued that this is the case in English based on (i) reconstruction, and (ii) possible gaps in A'-movement constructions. In particular, where total reconstruction is possible – as in topicalization structures – VP and AP gaps are possible because these structures involve no variables at all. In contrast, where partial reconstruction is necessary – as in *wh*-questions – we find abstraction over individuals that correspond to the properties, as in the case of VP questions and AP questions and adverbial questions.

## CHAPTER 4

### ELLIPSIS AND VARIABLES

#### 4.1 Introduction

In the previous chapter, I focused on the interpretation of gaps produced by movement; in this chapter, I will focus on the interpretation of gaps of a different nature: those that are cases of *ellipsis*. In particular, I will look at ellipses that have the distribution of VPs or NPs, as illustrated in the following examples (where  $\emptyset$  represents an elided phrase, and underlining signifies co-reference):

(276) If Jane leaves, Bill will  $\emptyset$  too. VP

(277) I'll wash these dishes if you wash those  $\emptyset$ . NP

Approaches to the interpretation of VP and NP ellipsis fall into at least two camps:<sup>72</sup> those that posit fully articulated syntactic structure for the elided phrase at LF (see, e.g., Wasow 1972, Sag 1976, Williams 1977, Hankamer 1979, Haik 1987, Tancredi 1992, Chomsky and Lasnik 1993, Fiengo and May 1994, Wilder 1995, Romero 1998, Fox 2000, Kennedy and Merchant 2000, Merchant 2001, 2005, Kennedy 2003, Goldberg 2005, Frazier and Clifton 2005, Elbourne 2005, among others) and those that treat the ellipsis as a variable – a higher-type variable, assuming that VPs and NPs are interpreted as properties – and thus on a par with pronouns such as *him* (see, e.g., Bach 1977, 1979,

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<sup>72</sup> Many of these analyses concentrate on VP ellipsis; whether NP ellipsis should be interpreted just like VP ellipsis remains an open issue, but seems to be assumed in, e.g., Merchant 2001 and Johnson 2004 (both building on Lobeck (1995), as well as Elbourne 2005. See Section 4.3 for further discussion of the interpretation of NP ellipsis.

Bach and Partee 1980, Rooth 1981, Partee and Bach 1984, Klein 1987, Dalrymple et al. 1991, Jacobson 1992, Kehler 1993, Hardt 1993, 1999, Hendriks and de Hoop 2001, among others).<sup>73</sup> I will refer to the former type of account as the *deletion* account, and the latter type as the *pro-form* account.<sup>74</sup> Clearly, my constraint supports the deletion account, but not the pro-form account. The question, then, is whether a case can independently be made for one account over the other.

There is a long-standing debate, however, over which of these accounts is superior on theoretical and empirical grounds, as both accounts enjoy a good measure of empirical success, and both accounts face empirical problems that the other does not (see, e.g., comparison of the two accounts in Kennedy 2003, Johnson 2001, Hardt 1993). My aim in this chapter, as a result, will not be to try to resolve this debate, but rather to show that a deletion view of ellipsis is a viable possibility, and to make clear the consequences – both good and bad – of adopting such a view of ellipsis.

The remainder of this chapter is organized as follows. In Section 4.1, I will review the deletion view of ellipsis, that is, the view of VP ellipsis by which it is represented at LF as a fully syntactically articulated VP, as illustrated in (278), where the strikethrough font designates unpronounced syntactic structure.

(278) Whenever Jane laughs, Bill does ~~laugh~~ too.

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<sup>73</sup> There are actually two variants under this first approach: the first generates the elided VP with fully articulated syntactic structure, which is at some point deleted or not pronounced (see, e.g., Tancredi 1992, Fox 2000, Merchant 2001, among others), and the second generates the elided VP as an empty node, which at LF is interpreted by copying an antecedent VP (see, e.g., Wasow 1972, Williams 1977, Lobeck 1995, among others). The differences between these two variants of the first approach will not matter here.

<sup>74</sup> I call the first type of account the “deletion account” for lack of a better name; as noted in footnote 2, however, there are two versions of this account, one of which involves not deletion but copying. I treat both as the same here, as both involve a fully articulated representation of a VP at LF.

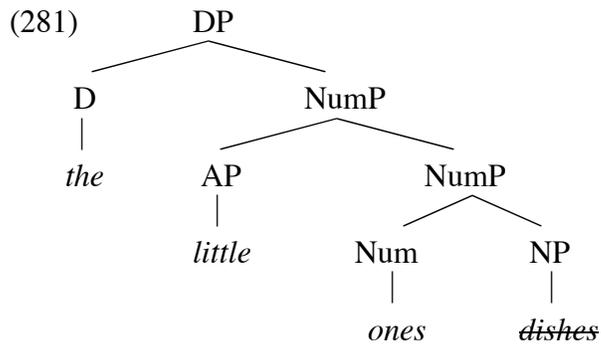
In this section, I will review empirical arguments for this view of ellipsis, and address in particular one major argument against it, that presented by so-called sloppy readings of VP ellipsis (Hardt 1997, Schwarz 2000). I will conclude from a brief review of these examples that how best to account for them is still up for debate, given that there are currently multiple competing accounts of these examples (e.g., Tomioka, to appear, Elbourne 2005), at least one of which does not make use of higher-type variables (namely, Elbourne 2005).

In Section 4.2, I will look at NP Ellipsis and *one*-anaphora. I will adopt the deletion account for NP Ellipsis, so that it has internal syntactic structure like that of an overt NP, as in (279).

(279) I'll wash these dishes if you wash those ~~dishes~~.

Further, following Llombart-Huesca (2002), I will argue that *one*-anaphora is an instance of NP Ellipsis, with *one* a Num head that immediately precedes an elided NP. For example, the DP *the little ones* in (280) is represented syntactically as in (281).

(280) I'll wash the big dishes if you wash the little ones.



By this analysis, *one(s)*-anaphora is not a counterexample to NHTV.

#### 4.2 VP Ellipsis

NHTV supports the deletion view of ellipsis, that is, an analysis of VP Ellipsis by which it is represented at LF as a fully syntactically articulated VP, as illustrated in (282).

(282) Whenever Jane laughs, Bill does ~~laugh~~ too.

An alternative analysis – at odds with NHTV – views VP Ellipsis as a variable; this can be represented by the LF in (283), in which  $\Delta$  represents a property variable, i.e., a variable over VP meanings.

(283) Whenever Jane laughs<sub>1</sub>, Bill does  $\Delta$ <sub>1</sub> too.

Researchers have long sought to resolve which of these analyses better accounts for the behavior of VP ellipses, and good arguments for both accounts have surfaced. Evidence

for the deletion account, for example, comes from examples that suggest that syntactic constraints, e.g., island constraints, are active in the ellipsis site (Hardt 1993, 1999 and Kennedy 2003); if VP Ellipsis were analyzed as a variable – and thus with no internal syntactic structure – it would be expected not to be sensitive to such constraints. I will review data suggesting that syntactic constraints are active within the ellipsis site in Section 4.2.1.

Evidence for the pro-form account of VP Ellipsis comes from examples that appear to be instances of sloppy readings of VP Ellipsis. If sloppy readings are best analyzed as bound variables, these examples potentially provide good support for treating them as variables. I will review these data, and accounts that have been proposed to account for them, in Section 4.2.2.

#### **4.2.1 Structural Constraints That Hold within the Ellipsis Site**

At least two types of syntactic constraints have been observed to hold within elided VPs:

(i) island constraints and (ii) binding theory constraints; I will review each in turn.<sup>75</sup>

##### **4.2.1.1 Island Constraints**

*Wh*-movement is possible out of an ellipsis site, as the examples in (284) show (based on Chao 1987, Tancredi 1992, Hardt 1993, Schwarz 2000, Johnson 2001, Kennedy 2003).

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<sup>75</sup> Kennedy (2003) argues that the picture is a little more complicated than this. Building on previous work of his with Jason Merchant (Kennedy and Merchant 2000), he shows that structural constraints that make reference to the interface between the syntax and phonological component do not hold within an ellipsis site, although they may hold for a pronounced VP. See references for further details.

- (284) a. I know  $wh_1$  Mary likes  $t_1$  and  $wh_2$  Kim doesn't  $\emptyset$ .
- b. The problems  $wh_1$  you can see  $t_1$  are easier to deal with than the ones  $wh_2$  you can't  $\emptyset$ .
- c. Hazelnuts,  $wh_1$  I like  $t_1$ ; peanuts,  $wh_2$  I don't  $\emptyset$ .

Strikingly, this movement is subject to island constraints, as the examples in (285) show (Haik 1987): each of these examples contrasts with those in (284) in that in them, the *wh*-phrase moves out of a restrictive relative clause island.<sup>76</sup>

- (285) a. \*I know  $wh_1$  Mary likes  $t_1$  and  $wh_2$  Bill wrote a whole song that he does  $\emptyset$ .
- b. \*The problems  $wh_1$  that you can see  $t_1$  are easier to deal with than the ones  $wh_2$  you wrote an article that explained  $\emptyset$ .
- c. \*Hazelnuts,  $wh_1$  I like  $t_1$ ; peanuts, I never made a pie that had  $\emptyset$ .

The ungrammaticality of the examples in (285) is expected if elided VPs have internal syntactic structure, and thus behave just like an overt VP, assuming that island constraints are defined over structural configurations (and not, e.g., semantically).<sup>77</sup> Further support

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<sup>76</sup> Sensitivity to island constraints sets VP ellipsis apart from *sluicing*, which is *not* sensitive to islands (Chomsky 1972, Lakoff 1972, Baker and Braine 1972, Chung, Ladusaw, and McCloskey 1995, Lasnik 2001, Merchant 2001), as the following examples show (from Merchant 2001):

- (i) a. They want to hire someone who speaks a Balkan language, but I don't remember which \_\_\_\_.
- b. \*I don't remember which Balkan language they want to hire someone who speaks \_\_\_\_.

I do not, however, see this as affecting the argument that VP ellipsis involves internal syntactic structure (see, e.g., Merchant 2001 for an account of the difference in behavior between VP ellipsis and sluicing).

<sup>77</sup> Jacobson (1992) and Hardt (1993) (the latter citing Lappin and McCord 1990), however, analyze examples like (284), in which a *wh*-phrase has moved out of the VP ellipsis site, as instances of *pseudo-gapping*. Under that account, these examples would be predicted to obey island constraints. See, however, Haik

for the conclusion that elided VPs are fully articulated syntactically comes from the behavior of the expressions *do so*, *do it*, and *do that*, which do *not* permit *wh*-binding, as the examples in (286) show (based on Johnson 2001).

- (286) a. \*I know who<sub>1</sub> Mary kissed *t*<sub>1</sub> and who<sub>2</sub> Kim didn't do so/do it/do that.  
b. \*The problems *wh*<sub>1</sub> that you can see *t*<sub>1</sub> are easier to deal with than the ones *wh*<sub>2</sub> that you can't do so/do it/do that.  
c. \*Hazelnuts, *wh*<sub>1</sub> I like *t*<sub>1</sub>; peanuts, *wh*<sub>2</sub> I don't do so/do it/do that.

This is expected if these expressions are just the combination of main verb *do* and a pro-form (see Section 2.5), and thus do not support *wh*-movement.

To summarize this section, the contrast between (286) on the one hand, and (284) and (285) on the other, follows if VP Ellipsis has the internal structure of a garden-variety VP, while *do so* and *do it* do not.

#### 4.2.1.2 Binding Theory Constraints

Assuming that Binding Theory constraints are evaluated over structural configurations (but cf. Reinhart and Reuland 1993, as discussed below), sensitivity to these constraints has also been used as evidence of syntactic structure. For example, the ill-formedness of (287a) suggests that Principle B is active within an elided VP (from Kennedy 2003):<sup>78</sup>

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(1997), Kennedy (1997, Tomioka (2001, and Johnson (2001) who present empirical problems for pseudo-gapping analysis of these examples.

<sup>78</sup> Some speakers of English find (287) acceptable, in which case this argument would not hold.

- (287) a. ??Kim takes care of him<sub>1</sub> because he<sub>1</sub> won't Ø.  
b. Kim takes care of him<sub>1</sub> because he<sub>1</sub> won't ~~take care of him<sub>1</sub>~~.

The ill-formedness of (287) can be accounted for if the ellipsis is syntactically articulated at LF, and if Principle B is assumed to be a structural constraint that holds at LF, as (287b) shows. Further, minimal pairs with *do so*, *do it*, and *do that* instead of VP Ellipsis are grammatical, which is again expected if these expressions are just the combination of *do* and a pro-form:

- (288) Kim takes care of him<sub>1</sub> because he<sub>1</sub> won't do it/do so.

That (288) contrasts with (287a) would be expected on the deletion view of ellipsis, since *do it* and *do so* would not incur violations of Principle B.

It should be noted, however, that Hardt (1997) – defending a pro-form account of VP Ellipsis – accounts for the ill-formedness of (287a) by assuming that Principle B is a semantic – and not a syntactic – constraint, following Reinhart and Reuland (1993). That is, assuming that predicates with two co-indexed arguments must be reflexive-marked, the examples in (288) would be bad because the predicate in VP Ellipsis is not reflexive marked.

#### **4.2.2 Sloppy VP Ellipsis**

The previous two sections provide positive evidence for the deletion account of ellipsis. In particular, the observation that *wh*-extraction out of VP ellipses is sensitive to island

constraints provides strong evidence for this account, assuming that there is good reason to take island constraints to be syntactic. There are, however, also certain examples that have been posited as problematic for this view of ellipsis, which have been argued to support the pro-form account of ellipsis. These are examples of what appear to be *sloppy readings* of VP Ellipsis, illustrated in (289) and (290) (from Hardt 1997 and Schwarz 2000; see also Sauerland 2004, Elbourne 2005, and Tomioka, to appear, for discussion of these examples):

(289) I'll help you if you want me to  $\emptyset$ . I'll *kiss* you even if you don't  $\emptyset$ .

(Hardt 1997, (16), attributed to Gawron/Pollard, p.c.)

(290) When John had to cook, he didn't want to  $\emptyset$ . When he had to *clean*, he didn't  $\emptyset$ , either. (Schwarz 2000)

In (289), the elided VP may be interpreted as “want me to kiss you”, and in (290), the elided VP may be interpreted as “want to clean”. Both Schwarz and Hardt liken these examples to sloppy readings of pronouns in ellipsis sites. Importantly, sloppy readings of pronouns have been accounted for by analyzing the pronouns as bound variables (Keenan 1971, Sag 1976, Williams 1977, Reinhart 1976, Lasnik 1976), and Schwarz extends this analysis to the sloppy VPs in (289) and (290), with the result that his account crucially makes use of variables over VP meanings (that is, higher-type variables). To make clear the account, let me review at this point analysis of sloppy readings of NPs (the more clas-

sic cases) as bound variables. Consider, for example, (287), which is ambiguous between a sloppy reading, and a strict reading.

(291) John loves his mother and Bill does too.

On one reading, (291) is true iff John loves his (own) mother, and Bill also loves John's mother; this is the so-called strict reading. On a second reading, (291) is true iff John is in his (own) office, and Bill is in his (own) office; this is the so-called sloppy reading. The ambiguity has been analyzed as an ambiguity between referential and bound (see references above). The strict reading, for example, can be represented by the LF in (292), in which the pronoun *his* in the elided VP co-refers with *John*.

(292) John<sub>1</sub> loves his<sub>1</sub> mother and Bill<sub>2</sub> does ~~love his<sub>1</sub> mother~~ too.

The sloppy reading, in contrast, can be accounted for by treating the pronouns in both VPs as bound variables, as in (296).<sup>79</sup>

(296) John [ $\lambda x . x$  is in  $x$ 's office] and Bill [ $\lambda x . x$  is in  $x$ 's office]

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<sup>79</sup> Hardt actually argues *against* the analysis of sloppy readings as cases of bound variables, and instead analyzes them in a different framework as shifts in the *discourse center*: A sloppy pronoun can shift its interpretation because it refers to the discourse *center*, the most prominent entity currently under discussion. See further discussion on this below.

Schwarz extends this analysis to the VP cases, by treating the sloppy VP as a bound variable. He assigns to (290), for example, the LF in (294), in which the sloppy VP is analyzed as a variable bound by an overt VP that fronts at LF.

(293) When John had to cook, he didn't want to  $\emptyset$ . When he had to *clean*, he didn't  $\emptyset$ , either. (Schwarz 2000)

(294) [<sub>VP</sub> cook]<sub>1</sub>  $\lambda_1$  [when he had to  $t_1$ , he didn't want to  $t_1$ ]  
 [<sub>VP</sub> clean]<sub>1</sub>  $\lambda_1$  [when he had to  $t_1$ , he didn't ~~want to  $t_+$~~ ]

By Schwarz's account, then, sloppy VPs are instances of bound VPs, and thus provide an argument for the pro-form (or variable) account of ellipsis.

There are, however, several problems for this analysis (as observed in, e.g., Schwarz 2000, Hardt 2003, Sauerland 2004, Elbourne 2005, and in particular Tomioka, to appear). For one, sloppy VPs may have *wh*-traces inside them, as (296) illustrates (Schwarz 2000, Sauerland 2004, Tomioka, to appear):<sup>80</sup>

(296) A: Why are you so upset with Fred? He bought the books *wh*<sub>1</sub> that he was supposed to  $t_1$ , right?  
 B: Yeah, but then he READ the books *wh*<sub>1</sub> that he WASN'T ~~supposed to read  $t_+$~~ .  
 (Tomioka, to appear)

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<sup>80</sup> See Tomioka (to appear) for discussion of how (296) controls for certain problems with Schwarz's original examples of this sort.

This makes the pro-form analysis of these cases look puzzling, as *wh*-movement out of ellipsis sites can be taken as evidence against the variable account of ellipsis (and in particular, that such movement is sensitive to island constraints).

A second problem for this account is illustrated by (298), which shows that pro-forms like *do so* or *do it* do not permit sloppy readings:

(296) When John had to cook, he didn't try to. When he had to clean, he didn't do it either. (based on Hardt 1999, Schwarz 2000)

If VP ellipses are analyzed as pro-forms, then it is unexplained why overt pro-forms like *do it* and *do so* do not permit sloppy readings.

A final problem is noted by both Schwarz and Hardt: If the sloppy VP is construed as a bound variable, we expect there to be a binder in the antecedent VP (which then appears in the elided VP). In order to get the right configuration for this, Schwarz, for example, QRs the embedded VPs, so that (295) is associated with the LF in (296).

(295) When John had to cook, he didn't want to  $\emptyset$ . When he had to *clean*, he didn't  $\emptyset$ , either. (Schwarz 2000)

(296)  $[_{VP} \text{cook}]_1 \lambda_1 [\text{when he had to } t_1, \text{ he didn't want to } t_1]$   
 $[_{VP} \text{clean}]_1 \lambda_1 [\text{when he had to } t_1, \text{ he didn't want to } t_1]$

As both Schwarz and Hardt observe, the problem with this analysis is that QR should not be possible out of an island. For example, when the universal *everyone* is embedded in a *when*-clause, as in (297), it may not bind the pronoun *he*; this can be explained by a restriction on QR as being clause-bound.

(297) When everyone left, he said goodbye.

Interestingly, Schwarz and Hardt point out that this a problem for all sloppy readings, not just those cases of sloppy VPs: Sloppy readings of NPs are also possible even when they are not bound in the antecedent VP (also observed in Westcoat 1989, Rooth 1992, Tomioka 1997). Consider, for example, (298), in which the antecedent NP for the first instance of *her* occurs in an island (example based on Schwarz 2000); as (299) shows, in order to analyze the sloppy reading of the ellipsis as containing a bound variable, the antecedents must QR out of *when*-clauses.

(298) When Karen wins, we congratulate her. When Sarah wins, we do, too.

(299) Karen<sub>1</sub> λ<sub>1</sub> [when *t*<sub>1</sub> wins, we congratulate her<sub>1</sub>]  
Sarah<sub>1</sub> λ<sub>1</sub> [when *t*<sub>1</sub> wins, we congratulate her<sub>1</sub>]

Given these problems with the bound variable approach to these examples, several alternative analyses of sloppy readings have appeared. Hardt (1993, 1999, 2003), for example, concludes that sloppy readings should not be treated as involving bound vari-

ables, and proposes a fundamentally different analysis, according to which sloppy readings instead involve shifts in the *discourse center*. I will not go into the specifics of Hardt's account here, except to say that although the analysis does not analyze sloppy VPs as bound variables, it does crucially treat them as variables. Tomioka (1999), in contrast, argues that problematic cases of sloppy identity involve E-Type pronouns – implicit definite descriptions. Schwarz notes that an analysis along these lines might be implemented for the VP cases. See also Elbourne (2005) and Tomioka (to appear) for further alternatives, the latter making use of higher-type variables, the former not.

I will conclude here that the best analysis for these examples remains an open issue, and thus until a stronger account of them can be proposed, it is unclear whether they do or not provide strong evidence against NHTV.

#### **4.2.4 Summary**

To summarize this section, I have tried to show that there is ample independent support for treating VP Ellipsis as having fully articulated internal syntactic structure at LF, and thus does not make use of higher-type variables. I have also tried to make clear potential problems that come along with adopting this view of ellipsis, in particular, it is presently unclear whether sloppy readings of VP Ellipsis are a challenge to the deletion account of ellipsis, given that there are presently multiple competing accounts of these examples, including Elbourne (2005), which does not make use of higher-type variables.

### 4.3 NP Ellipsis

NP Ellipsis is illustrated in the following examples, in which an NP following a possessive determiner – *his* in (a) and *Max's* in (b) – is absent (based on Jackendoff 1968, 1971, Perlmutter 1970):

- (300) a. My shirt is the same as his  $\emptyset$ .  
b. Bill's story may be amazing, but Max's  $\emptyset$  is virtually incredible.

Following Elbourne (2002), I will assume that NP Ellipsis may follow almost any determiner, as the paradigm in (301) shows (examples based on Elbourne 2002); I assume that the determiners *a*, possessives such as *my*, or *no* alternate as *one*, *mine*, and *none*, respectively, when followed by NP Ellipsis, as (e) – (g) illustrate (Perlmutter 1970, Stockwell, Schachter and Partee 1973, Elbourne 2002). Only two determiners may not precede an elided NP, namely, *the* and *every*, as (h) and (i) show (however, as discussed in Section 4.5, Elbourne takes *the* to surface as *it* before an elided NP, as suggested in Postal 1966.)

- (301) a. I'll wash these dishes, if you wash those  $\emptyset$ .  
a. Sue bought two books, and Mary bought three  $\emptyset$ .  
b. Most people bother Joe, but he does like some/a few  $\emptyset$ .  
c. The boys came to the party; each/both/neither  $\emptyset$  brought presents.  
d. Many went south; few/most/all  $\emptyset$  returned.  
e. Your kids are taller than mine/\*my  $\emptyset$ .  
f. Two heads are better than none/\*no  $\emptyset$ .

- g. I wanted to read a book, so I bought one/\*a  $\emptyset$ .
- h. \*Sue only bought one book, but Mary bought every  $\emptyset$ .
- i. \*I wanted to read the best book in the store, so I bought the  $\emptyset$ .

Less attention has been devoted in the literature to the interpretation of NP Ellipsis than to that of VP Ellipsis, but here too, the issue arises whether the elided constituent is best analyzed as fully articulated at LF, or rather, as a variable over NP meanings, that is, a higher-type variable, assuming NPs denote properties of individuals. In the following sections, I will look at whether there is evidence favoring one account over the other by (i) trying to determine whether syntactic constraints hold within the ellipsis site, and (ii) looking at potential cases of sloppy readings of NP Ellipsis. Again, I will try to make clear the consequences – both good and bad – of adopting a deletion account of ellipsis, as this is the account that NHTV supports.

#### **4.3.1 Structural Constraints That Hold within NP Ellipsis**

As with VP Ellipsis, we can ask whether there is any evidence of internal structure in NP Ellipsis by observing whether syntactic constraints are active within the ellipsis site. One way of testing this is to check whether *wh*-movement is possible out of NP Ellipsis, and further, whether this movement obeys island constraints. Testing this, however, is made difficult by the fact that many examples in which *wh*-phrases move out of a DP are degraded. For example, movement out of a DP with a strong determiner (e.g., a possessive) is judged worse than movement out of a DP with a weak determiner, as the following contrast illustrates:

- (302) a. ?Who does Mary want a picture of  $t_1$ ?  
 b. ??Who does Mary like her pictures of  $t_1$ ?

Trying to control for this factor, the examples in (303) suggest that *wh*-movement out of an elided NP is judged ungrammatical.<sup>81</sup> In (303a), for example, *who* has moved out of the elided NP, *picture of  $t_2$* , resulting in ungrammaticality. Compare the improved (303b), in which the same NP is *not* elided, as well as (303c), in which the head noun is elided (gapped), but the PP out of which *who* moves crucially is not (recall that *a* alternatives with *one* when followed by an elided N or NP).

- (303) a. \*I know  $who_1$  Mary has a picture of  $t_1$ , and  $who_2$  John WANTS one  
~~picture of  $t_2$ .~~  
 b. ?I know  $who_1$  Mary has a picture of  $t_1$ , and  $who_2$  John WANTS a  
 picture of  $t_2$ .  
 c. I know  $who_1$  Mary has a picture of  $t_1$ , and  $who_2$  John WANTS one  
~~picture of  $t_2$ .~~

These examples suggest that *wh*-movement is *not* possible out of an elided NP, and thus potentially provide evidence against the deletion account of ellipsis. However, given the awkwardness of the non-elided versions of these examples (as in (303b), for example), these examples perhaps should not be taken to have too much bearing on issue of how

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<sup>81</sup> Chisholm (2003) claims that whether movement is possible out of an elided NP cannot be tested, because he argues that NP ellipsis is only possible in DPs that have a possessive determiner. I am unconvinced, however, by his arguments for that position, which are largely based on whether or not NP ellipsis may be pragmatically controlled. See Chisholm (2003) for further details.

best to analyze NP Ellipsis. Moreover, puzzlingly, unlike a *wh*-operator, a quantifier *can* bind into a deleted NP, as the example in (304a) show.

- (304) a. Each prisoner<sub>1</sub> suspected that that *Al Jazeera* would publish most pictures of him<sub>1</sub>, but that *CNN* would only publish a few ~~pictures of him<sub>1</sub>~~.
- b. \*Each prisoner<sub>1</sub> suspected that that *Al Jazeera* would publish most pictures of him<sub>1</sub>, but that *CNN* would only publish a few ~~pictures~~ of him<sub>1</sub>.

As (304b) shows, binding is not possible when the pronoun is overt. I do not at this time know what to make of this data, except to conclude that when and why binding into the ellipsis site is possible or not is unresolved.

#### 4.3.2 Sloppy NP Ellipsis

As with VP Ellipsis, sloppy readings of NP Ellipsis are possible (Elbourne 2005), as (305) shows.

- (305) When Bill wanted some advice, I gave him some. When he wanted some money, I didn't ~~give him some money~~.

The same problems that arose for analyzing sloppy readings of VP Ellipsis as bound variables over VP meanings, however, also hold for analyzing sloppy readings of NP Ellipsis as bound variables over NP meanings. In particular, in order to create a binder for the bound variable (over NP meanings) in the elided VP, the NP might be QR-ed as (306)

shows; this however, violates the clause-bound restriction on QR, as the NP is fronted out of a *when*-clause.

- (306) [<sub>NP</sub> advice]<sub>1</sub> λ<sub>1</sub> [when Bill wanted some *t*<sub>1</sub>, I gave him some Δ<sub>1</sub>]  
[<sub>NP</sub> money]<sub>1</sub> λ<sub>1</sub> [when Bill wanted some *t*<sub>1</sub>, I didn't ~~give him some Δ<sub>1</sub>~~]

Here too, I will conclude that it is presently unclear whether sloppy readings of NP Ellipsis are a challenge to the deletion account of ellipsis, given that there are competing analyses of these examples, and in particular that the analysis of Elbourne (2005) does make use of higher-type variables, but rather assigns to these cases fully articulated syntactic structure at LF.

#### 4.4 *One(s)*-Anaphora

*One*, as used in (307), has previously been analyzed as an NP pro-form (Ross 1967, Jackendoff 1977, Hornstein and Lightfoot 1981, Stockwell, Schachter and Partee 1973, among others). The analysis is based on two observations, both illustrated in (307): (i) *one* appears to have the distribution of an NP – occurring in a position following a determiner and adjective – and (ii) semantically it seems to pick up the reference of a preceding NP.

- (307) I'll wash the big dishes if you wash the little *ones*.

Llombart-Huesca (2002), however, presents several arguments against analyzing *one* in this way. She proposes instead that *one* is phonological support (in the sense of *do*-support) of a number affix that is stranded as a Num head in certain cases of NP Ellipsis, when an empty Num head cannot be licensed. In the following section, I will review Llombart-Huesca's arguments against the pro-form account of *one*, and the basic aspects of her account.

#### 4.4.1 *One* as Num

Llombart-Huesca (henceforth, LH) presents several problems for an analysis of *one* as an NP pro-form. First, *one(s)*-anaphora cannot pick up the reference a mass noun, as the following examples show (Jackendoff 1971):

- (308) a. \*John had some chocolate cake, and Mary had some vanilla *one(s)*.  
b. \*He drank a lot of beer, but I didn't drink much *one(s)*.

If *one* is simply a variable over properties, it is unclear why it should be restricted to count nouns only. Note that NP Ellipsis, in contrast, is not subject to this constraint (Jackendoff 1971):

- (309) a. John had some *cake*, and Mary had some  $\emptyset$ , too.  
b. He drank a lot of *beer*, but I didn't drink much  $\emptyset$ .

Second, *one* may not simply appear wherever an NP may; it may not, for example, occur following a quantificational determiner unless an adjective follows the determiner, as (310a-b) show.

- (310) a. \*Jack bought a few cupcakes. I bought several ones too.  
b. Jack bought a few yellow cupcakes. I bought several pink ones.

Again, if *one* is simply an NP pro-form, it is unclear why it should not appear exactly where an NP may. The situation is similar for the definite determiner: *one* may not occur with the definite determiner *the* unless a restrictive modifier – e.g., an AP or PP – also occurs, as the following contrasts show:

- (311) a. \*Ella likes the car and I like the one, too.  
b. Ella likes the blue car and I like the pink one.

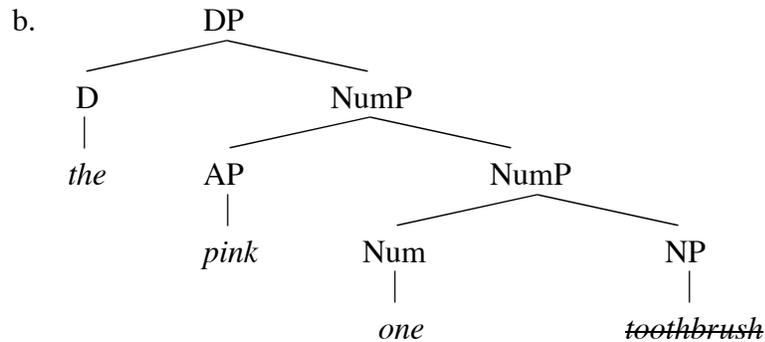
- (312) a. \*Ella likes the car near the door and I like the one too.  
b. Ella likes the car near the door and I like the one near the deck.

If *one* was an NP pro-form, it would be need to be explained why it does not occur in environments like *\*the one*.

LH proposes to account for these observations by analyzing *one* not as an NP pro-form, but as *phonological support* for a morphological number affix that occupies the Num position, in the same way that *do* provides phonological support for a tense affix in

I, when I is not adjacent to V. By LH's account, *one(s)*-anaphora is an instance of NP Ellipsis, so that, for example, *the pink one* in (313a) would correspond to the LF in (313b) (I assume that AP left adjoins NumP):

(313) a. I like the green toothbrush better than the pink one.



LH motivates her analysis from a number of perspectives, which I will review here in turn. First, she provides some support for this syntax from Italian. Italian has a process like English *one(s)*-anaphora, by which *uno/-a* ('one') appears to substitute for a previously mentioned NP, so that (314b) can be used to mean the same as (314a), in a context in which *auto* is previously mentioned (data from LH, based on Rizzi 1990):

- (314) a. un'auto enorme sarebbe meglio.  
 an/one enormous car would-be better
- b. una enorme sarebbe meglio  
 an/one enormous would-be better
- c. \*un'enorme sarebbe meglio  
 an/one enormous would-be better
- d. un'altra sarebbe meglio  
 an/one enormous would-be better

Interestingly, phonological reduction of *una* can occur in (314a), but not in (314b), as (314c) shows. LH points out that this can be explained if it is assumed that *auto* is elided in (b), thereby blocking *una* from reducing due to a following vowel-initial word. Further support for this analysis comes from (314d), where *una* is followed by a vowel initial *pre-nominal* adjective, and phonological reduction is in this case possible; this can be explained assuming that reduction is not blocked in this case, because the ellipsis follows the adjective.

Second, she proposes that *one* does the semantic work of a Num head, which she identifies as having the semantics of a classifier. Spelling this out along the lines of Krifka (1995) and Kratzer (2005), Num (and in effect, *one*) here could be construed as a function from kinds to the properties of individuals that exemplify them (thus, *one* here is taken as doing the semantic work of Kratzer's null classifier):

$$(315) \quad \llbracket I_{Num} \textit{one} \rrbracket = \lambda x . [\lambda y . x \leq y]$$

(316)  $\|toothbrush\| = \text{TOOTHBRUSH}_k$

(317)  $\|one \text{ ~~toothbrush~~$

This, she proposes, accounts for the count noun restriction on *one*: because *one* has the semantics of number morphology – which is only compatible with count nouns – it necessarily results in a non-mass interpretation.

Finally, LH motivates the construal of *one(s)*-anaphora as an instance of NP Ellipsis by showing that the two constructions are largely in complementary distribution, with *one* surfacing in just those cases that Num would otherwise be stranded. Specifically, Num, she proposes, is stranded when two conditions hold: (i) it cannot merge with N because the N has elided (as in the case of NP Ellipsis) – this is similar to tense morphology in I, which cannot merge with V when V has elided (as in the cases of VP Ellipsis) (Halle and Marantz 1993, Bobaljik 1994, Lasnik 1995), and (ii) it is not licensed by a determiner with strong features. Following Lobeck (1995), LH assumes that certain determiners have strong features and as a consequence may license an empty Num head; determiners that have strong features are possessive Ds (e.g., *mine*), quantificational determiners (e.g., *most*) and plural demonstratives (*these*, *those*).<sup>82</sup> Determiners that do *not* have strong features are *the*, *every*, and *this*. Further, she proposes that the element holding the strong agreement feature must immediately c-command the empty Num in order to license it. To illustrate her analysis, consider the following three structures, in which the null Num head is licensed by a determiner with strong features: a possessive deter-

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<sup>82</sup> LH's analysis is a departure from Lobeck's however, in that LH assumes that only functional heads must be licensed. That is, for LH, empty lexical heads need not be licensed, as is the case for Lobeck.

miner in (318), a plural demonstrative determiner in (318), and a quantificational determiner in (319).<sup>83</sup>

(318) a. Some birds flew south, but many ~~birds~~ stayed behind.

b. [<sub>DP</sub> many [<sub>NumP</sub> [<sub>Num</sub> [+pl] ] [<sub>NP</sub> ~~birds~~]]]

(319) a. I like these phones, but not those ~~phones~~.

b. [<sub>DP</sub> those [<sub>NumP</sub> [<sub>Num</sub> [+pl] ] [<sub>NP</sub> ~~phones~~]]]

(320) a. Your kids are shorter than mine ~~kids~~.

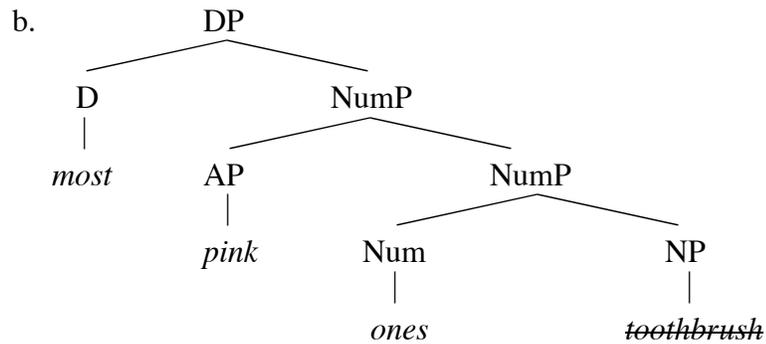
b. [<sub>DP</sub> mine [<sub>NumP</sub> [<sub>Num</sub> [+poss] ] [<sub>NP</sub> ~~kids~~]]]

For the three above cases of NP Ellipsis, the empty Num is licensed, and *one*-support is not required. In contrast, there are two main cases in which an empty Num would *not* be licensed, and *one* surfaces. First, adjectives block a strong determiner from licensing Num, which explains the need for *one* to surface in (321).

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<sup>83</sup> LH's syntactic trees are slightly different than those above, in that she assumes that quantificational determiners occur as heads of QP, and possessive determiners occur in the specifier of DP. The simplifications I have made above do not affect her arguments presented here.

(321) a. I like some green toothbrushes, and most pink ones ~~toothbrushes~~.

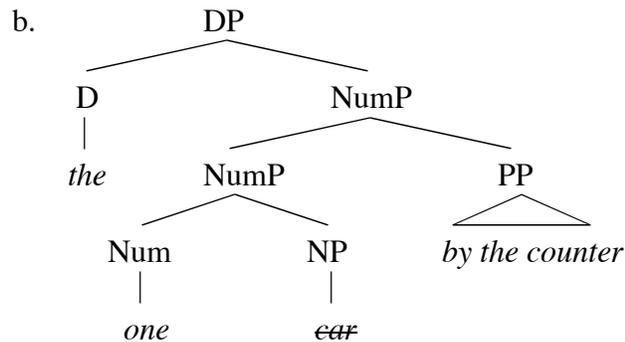


Second, determiners that do not bear strong features, such as the singular demonstrative or the definite determiner must occur with *one*.<sup>84</sup>

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<sup>84</sup> It is unclear, by LH's analysis, why *\*the one* is ungrammatical, given that *the* does not bear strong features. The absence of *\*the one* could, however, be account for by assuming that *the* followed by NP ellipsis is phonologically realized as the pronoun *it* (as proposed in Elbourne 2002, based on Postal 1966.)

(322) a. I like the car over there, but I don't like the one by the counter.



In (322), *the* does not bear strong agreement, and thus may not license the number affix in Num.

Although *one(s)*-anaphora are largely in complementary distribution, there are some environments in which some speakers permit both *one* and NP Ellipsis to occur. In particular, some speakers permit both following the singular and plural demonstrative determiners, as illustrated in (323) and (324) ((323b), in particular, is prescriptively bad).

(323) a. I like these glasses but I don't like those.

b. ?I like these glasses but I don't like those ones.

(324) a. ?I like this hat and you like that.

(Johnson 2005)

b. I like this hat and you like that one.

LH suggests for the plural cases that there some dialectal parameterization regarding which determiners are specified with strong features (and thus can license an empty Num head).

If NP Ellipsis and *one(s)*-anaphora both are instances of NP Ellipsis, then we should expect them to behave identically with respect to some of the diagnostics for syntactic structure internal to the elided site. This seems to be borne out, as shown in the following sections. Like NP Ellipsis, *wh*-movement is not possible out of *one(s)*-anaphora, as (325a) shows, although quantificational binding into *one(s)*-anaphora is possible, as (325b) shows.

- (325) a. I know who<sub>1</sub> Sarah has a good picture of *t*<sub>1</sub>, and who<sub>2</sub> Ralph has a bad one \_\_\_  
 \*(?of).
- b. Each prisoner<sub>1</sub> hopes that Mary<sub>3</sub> will publish her good pictures of him<sub>1</sub>, and that she'll burn her bad ones \_\_\_.

Similarly, as with NP Ellipsis, sloppy readings do seem to be possible for *one(s)*-anaphora, although the examples are more complicated to construct with *one*. For example, the elided VP in (326) below perhaps may be interpreted as meaning “want a big kiss”.

- (326) When she wants a hug, I give her a big one. When she wants a kiss, I don't.

The same problem, however, arises for deriving sloppy readings of *one* here, if such readings are derived by treating *one* as a bound variable: in order to create a binder for *one*, *a kiss* would have to QR out of a *when*-clause in order to bind a variable in the elided VP.

To sum up, LH presents arguments against treating *one* as a NP pro-form, and instead for treating it as phonological support for stranded number morphology in a Num head. Any theory that posits *one* as a pro-form must explain why it does not have the same distribution as an ordinary NP, and why it is (largely) in complementary distribution with NP Ellipsis. LH's explanation explains the restriction that *one* can only pick up the reference of count nouns, as the result of *one* having the semantics of number morphology, which only is compatible with count nouns, in the same way that only count nouns – and not mass nouns – may be pluralized (see, e.g., Chierchia 1998 and references therein).

If LH's arguments go through, and *one*-anaphora is an instance of NP Ellipsis, and if, in turn, if the interpretation of NP Ellipsis does not involve variables, then *one*-anaphora does *not* provide a counterexample to NHTV.

#### **4.5 E-Type Pronouns as NP Ellipsis**

In the context of NP Ellipsis, it is worth observing that Elbourne (2002) argues that *e*-type pronouns – which have previously been analyzed as involving a covert property variable – should be construed as instances of NP Ellipsis. In this section, I will briefly review the motivation for his account.

The problem of *e*-type pronouns is illustrated in (327); these pronouns sometimes display co-varying readings without being c-commanded by any obvious potential binder.

(327) Every man who owns a donkey hugs it.

One solution to this problem is to treat the pronoun like a disguised definite description, as in (328) (Evans 1977, Cooper 1979).

(328) Every man who owns a donkey hugs [the donkey he owns].

The account has been implemented by treating the descriptive content of the definite description as provided by a free variable over relations, that is, a higher-type variable (Cooper 1979). For example, in the version of the account in Heim and Kratzer (1998), in which e-type pronouns are represented at LF as in (329).

(329) [*the* [ $R_{\langle i, \langle e, et \rangle \rangle}$  *pro*  $_{\langle j, e \rangle}$ ]]

Assuming that (329) corresponds to the pronoun *it* in (327), the relation variable  $R$  would pick up the salient *donkey-owned-by* relation, and the individual variable *pro* would be bound by the subject, *every man*. In effect, (327) would be true iff if every individual  $x$  such that  $x$  is a man who owns a donkey beats the donkey owned by  $x$ . Elbourne proposes instead that e-type pronouns are actually definite articles whose complements are subject to NP-deletion, as in (330a). Building on Postal (1966), he assumes that when *the* is followed by NP Ellipsis, it is pronounced as *it*, so that (330a) is pronounced as (330b).

- (330) a. Every man who owns a donkey beats the ~~donkey he owns~~.  
b. Every man who owns a donkey beats it.

Elbourne supports his analysis of e-type pronouns as instances of NP Ellipsis by showing that the descriptive content of an e-type pronoun behaves like elided material. For example, NP Ellipsis is not possible in examples like (331b), in which *hers* would mean her guitar, the elided NP (i.e., *guitar*) being inferred from the meaning of the preceding sentence, *Mary is a guitarist*.<sup>85</sup>

- (331) a. Mary has a guitar. She should bring hers.  
b. Mary is a guitarist. \*She should bring hers.

Elbourne refers to such cases as ‘inferable antecedents’. E-type pronouns are subject to the same restriction, as the contrast in (332) shows (Elbourne 2002, based on Heim 1982, 1990).

- (332) a. Someone who has a guitar should bring it.  
b. \*Some guitarist should bring it.

If all that was required to recover the descriptive content of an e-type pronoun was a salient property, the relation *married to* should be made salient in (332b). This data thus supports the construal of e-type pronouns as instances of NP Ellipsis.<sup>86</sup>

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<sup>85</sup> However, it is possible for NP Ellipsis to be pragmatically controlled, that is, it does not *require* a linguistic antecedent (I follow Elbourne in disputing the judgments of Lasnik and Saito 1992, who claim that NP Ellipsis *cannot* be pragmatically controlled.) For example, in a context in which someone reaches for a pair of gloves on the table which happen to be Sue’s, it is acceptable to say “No, those are Sue’s!”, without having mentioned “Sue’s gloves”, as long as they are contextually salient.

<sup>86</sup> Note that *one(s)*-anaphora behaves the same way, that is, it does not permit inferable antecedents either:

- (i) a. Mary has a guitar. She should bring that one.

## 4.6 Chapter Summary

In this chapter, I have adopted analyses of VP and NP ellipses according to which they have internal syntactic structure just like that of an over VP or NP at LF, and thus are consistent with NHTV. I have reviewed arguments that have been presented in support of this view of ellipsis, as well as certain examples that may be problematic for this view. I have also adopted the analysis of *one(s)*-anaphora according to which it is an instance of NP Ellipsis, following Llobart-Huesca (2002), and thus does not pose a counter-example to NHTV.

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b. Mary is a guitarist. \*She should bring that one.

This is further support for treating *one(s)*-anaphora as a case of NP Ellipsis.

## CHAPTER 5

### CONCLUSION

In this brief chapter, I would like to summarize the thesis proposed and also outline some paths for future research.

The main claim of this thesis is that variables in the LF representations of natural languages range only over individuals. While this makes very restrictive predictions about the inventory of constructions that involve variables, these restrictions seem to hold for the cases I have looked at, namely, the pro-forms *such*, adverbial *so* (and *thus*), *do so*, predicative *so*, and A'-constructions such as topicalization and *wh*-movement.

Put in a broader context, I see this thesis as bringing together three lines of research: (i) investigating the syntax-semantics of non-nominal anaphora; (ii) exploring potentially universal semantic constraints on possible variables; and (iii) studying the syntax-semantics of morphology that involves reference to kinds, and its parallels to morphology that involves reference to degrees (as in Bolinger 1972).

There are several paths that one might take from here, to pursue this research further, which I will outline in the following three paragraphs.

First, I have motivated this constraint based primarily on data from English, German, and Polish, and one would certainly want to test the cross-linguistic validity of the constraint as a potential semantic universal. In particular, one would want to look at types of non-nominal clitics (in, e.g., the Romance languages), as well as possible non-nominal resumptives (in, e.g., Hebrew). If higher-type pro-forms are possible, we might expect both of these types of expressions to occur.

Second, I have not looked in this work at propositional pro-forms such as *that* in *She knows that*. I see no immediate problem in viewing such pro-forms as ranging over individuals that correspond to propositions. However, further investigation of these pro-forms remains an area for future research.

Finally, the similarities in syntax and semantics between *such* (and its related forms) and degree morphology (such as *how* and degree *so*) raises the broader question of why, in English and across languages, expressions that make reference to kinds and degrees seem to share morphology, e.g., *such*, *so*, *as*, and *how* (as pointed out in Bolinger 1972). This sets as a direction for future research further investigation of the theoretical and cross-linguistic links between kind and degree morphology.

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