

Aspects of A

by

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Submitted to the Department of Linguistics and Philosophy
in partial fulfillment of the requirements for the degree of
Doctor of Philosophy
at the
Massachusetts Institute of Technology

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ABSTRACT.

This is another thesis about the interpretation of indefinites. It argues that English singular indefinites are individual-denoting expressions that encode a dependency on situations and carry a uniqueness presupposition. In particular, it argues that, once we accept that the indefinite determiner imposes a uniqueness presupposition, we gain an understanding of the phenomenon of *quantificational variability*. At the heart of the explanation is the idea that the uniqueness presupposition provides a clue on the basis of which we identify the domain of an adverbial quantifier.

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Confession.

This dissertation is an expanded version of roughly half of a paper that I presented at the Edinburgh meeting of LAGB in April 1997. There are still many rough and sketchy spots. I intend reworking the more hastily written sections and filling in gaps before circulating and distributing the thesis. My hope is also to summarize further research that did not make it into this version despite the fact that chronologically it preceded much of the work that did.

In accordance with the rest of the thesis, my acknowledgments too will be incomplete and sketchy, and I fully intend fleshing them out in the later version. I will just mention briefly a few people to whom I am particularly grateful.

Most of all, my supervisor, Irene Heim. My other committee members: Kai von Fintel, Noam Chomsky, Michel de Graff, David Pesetsky. Irene's and Kai's influence on my thinking will (I hope) be obvious. What I have accomplished in the course of my education here, I have accomplished thanks to them.

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Chapter 1. Introduction

1. Russell's ghost

Behind every theory of indefinites looms the spectre of Bertrand Russell.

Let us call DPs with the singular indefinite determiner *a* -- for instance, *a pin* -- *singular indefinites*. Russell proposed that sentences containing singular indefinites make existential claims. One way of articulating the Russellian view is to say that *a* is a quantifier just like other natural language quantifiers, a quantifier with existential force. On this view, *a* contributes to an assertion just what a quantifier like *at least one* contributes. So on this view, (1) asserts the same thing that (2) does. It says that the set of pins and the set of things that dropped have a non-empty intersection.^{1, 2}

(1) A pin dropped.

¹ One popular way of expressing Russell's view assumes that sentences of natural language receive translations as sentences of predicate logic. On this approach, the role of singular indefinites is to introduce an existential quantifier into the translation of a sentence. (1) would receive a translation like the one in (i):

(i) $\exists x (Px \ \& \ Dx)$

This differs slightly from Russell's (1919) precise account. Russell would have said that the sentence *A pin dropped* is interpreted as saying that a *propositional function* of the form *Px & Dx* is sometimes true. A propositional function is in appearance a formula of predicate logic, but it is a function from terms to propositions. To say that a propositional function of the form *Px & Dx* is sometimes true is to say that there is at least one term such that *Px & Dx* applied to that term is true -- or, more loosely speaking, that there is at least one value of *x* such that *Px & Dx* is true.

² Russell did not make so much of the singular indefinite determiner per se. In Chapter 15 of Russell 1919 (the chapter "Propositional Functions"), Russell concentrates on the analysis of *some*. However, in Chapter 16 (the chapter "Descriptions"), he makes it clear that *a* deserves the same analysis. Elements of this general line of thought can be traced back to the beginnings of predicate logic in Frege's *Begriffsschrift*.

- (2) At least one pin dropped.

The Russellian view of indefinites is extremely influential, to the extent that it is often treated as a null hypothesis. At the same time, problems with it are well known.

On the one hand, there is the puzzle posed by so-called *specific indefinites*. If we analyze indefinites as quantificational expressions with existential force, we have to conclude that they are strangely free from restrictions that other quantificational expressions of natural language are subject to. Quantifiers typically cannot take scope outside their clause, but, if we analyze indefinites as existential quantifiers, they do not seem to be so constrained in their scope. Here is a brief and very rough demonstration of this; maybe some will not share the precise judgments that I report here, but the effects as a whole are documented quite thoroughly in the literature (see, e.g., Fodor and Sag 1982, Heim 1991, Reinhart 1995). Because I don't intend to go into detail here, I'll talk about intuitions of quantifier scope informally and in terms of stilted paraphrases.

First consider the sentence in (3).

- (3) I will drastically rework the syllabus if no student of mine fails the exam.

If the quantifier *no* were free to take scope outside its clause, it would be possible to read (3) as an expression of impartiality -- as saying that there is no student of mine such that I will drastically rework the syllabus if she fails the exam. But we cannot read (3) this way. Rather, we read (3) as making a truly heartless claim -- that in the event that no student of mine fails the exam, I will drastically rework the syllabus. This indicates that the scope of the quantifier *no* is constrained so as to include only material in the antecedent of the conditional.

Now, however, consider the sentence in (4), which contains an indefinite.

(4) I will drastically rework the syllabus if a student of mine fails the exam.

It is appropriate for me to say this if I have *some particular student in mind* whose needs I feel that the class should be geared to. I can utter the sentence truthfully if I've decided that I'll rework the syllabus if Alice fails the exam, but that I will not if, say, Beth or Carol do. If indefinites are quantificational expressions with existential force, this is a surprise. If the scope of the existential quantifier is constrained in the same way that the scope of *no* is in (3), then (4) should say that, in the event that at least one student of mine fails the exam, I will drastically rework the syllabus. And this would be a false statement, given that I have no intention of reworking the syllabus if only Beth or Carol fail the exam. It seems that, if the indefinite in (4) contains an existential quantifier, then (4) admits a reading under which the existential quantifier takes scope outside its clause -- under which (4) says that there is at least one student of mine such that I will drastically rework the syllabus if she fails the exam.

This, then, is one of the curiosities that we are faced with when we adopt the Russellian view. We are forced to say that indefinites differ from other quantificational expressions in that they are immune from scope constraints. Indeed, indefinites differ in this way even from the quantificational expressions they are supposed to resemble closely, those containing *at least one*. Unlike (4), (5) seems to be false if I won't rework the syllabus in the event that Carol fails the exam.

(5) I will drastically rework the syllabus if at least one student of mine fails the exam.

More damning than the puzzle of specific indefinites is the problem of what we might call *quantificationally variable indefinites*. Sometimes, indefinites seem as though they are stealing quantificational force from another operator in the same sentence. The effect is known as *quantificational variability*. Some typical examples are the sentences in (6):

- (6) a. A percussionist is usually hard of hearing.
- b. A percussionist is always hard of hearing.

The sentences in (7) paraphrase the sentences in (6) fairly naturally. These paraphrases contain a quantifier whose force (near-universal for *most*, universal for *all*) is arguably the same as the force of the corresponding quantifier (*usually*, *always*) in the sentences that they paraphrase.

- (7) a. Most percussionists are hard of hearing.
- b. All percussionists are hard of hearing.

If indefinites are quantificational expressions with *existential* force, it is far from clear how sentences like (6) wind up making (*quasi-*) *universal* claims about percussionists.

Note that, with respect to their behavior in sentences like (6), indefinites again seem to differ from quantificational expressions containing *at least one*. The sentences in (8), which are parallel to the ones in (6) except for the fact that *a* has been replaced by *at least one*, do not seem able to make the same claims that the sentences in (6) make: they do not admit the paraphrases in (7).

- (8) a. At least one percussionist is usually hard of hearing.
 b. At least one percussionist is always hard of hearing.

Also, the sentences in (6) do not seem able to make the same claims that the sentences in (8) make.³ Suppose I tell you that I go to the symphony very often, and *at least one percussionist is always hard of hearing* ((8b)). I can say this truly even if every concert that I attend involves more than one percussionist, and not all of the percussionists are hard of hearing: it is sufficient that, at each concert that I attend, one percussionist is hard of hearing. But if these are the circumstances, I cannot tell you truly that I go to the symphony very often, and *a percussionist is always hard of hearing* ((6b)).^{4, 5}

Just as problematic as the cases in (6) are sentences that express quasi-universal claims but in which there is no overt adverb of quantification. Sentences like (9) are said to contain instances of *generic indefinites*.

³ The relevant judgments are apparently subject to variation. As far as I can see, this doesn't pose a problem for what I am about to say in the thesis. (In my opinion, the variation has to do with how easily speakers can conjoin the predicate *percussionist* with an implicit predicate one of whose constituents is a variable over situations.)

⁴ The theory I develop predicts that a sentence like (i) will seem odd to begin with -- or at least that they will be more difficult to process than parallel sentences with *at least*, or sentences like (6b) from which the first conjunct is omitted. (It predicts this on the assumption that in conjunctive sentences like this, we naturally take *usually* to quantify over situations that correspond to a single concert, and on the assumption that we understand that concerts may contain more than a single percussionist each.) I think in fact that (i) is not so good, but gets better when *percussionist* is interpreted contrastively. I don't know why contrastive focus should make a difference.

(I) I go to the symphony very often, and a percussionist is always hard of hearing.

⁵ Still, it requires more work to show that *a* cannot express what *at least one* expresses. This is because there is apparently another factor that constrains the use of *a*: *a* cannot be stressed. To show that *a* cannot express what *at least one* expresses, one must take care to construct examples with *at least one* in which *at least one* apparently does not require stress. If substituting *a* for *at least one* in these examples yields a different interpretation, that is a strong indication that *a* does not have the meaning of *at least one*. If instead one considers examples where *at least one* is stressed, any *at least one* interpretation that *a* might receive in a parallel sentence might be ruled out by independent considerations. I am not convinced that the examples in (8) are of the right type for arguing that *a* cannot express what *at least one* does.

(9) A cyclops has a single eye and no sense of humor.

Wilkinson 1986 and others have argued that sentences like (9) contain a covert adverb with quasi-universal force, a silent *usually* or *typically*. On their view, sentences like (9) are just another instance of quantificational variability. I will assume in this thesis that their view is right, and that, once we know what is going on in sentences like (6), nothing further needs to be said about generic indefinites.

My dissertation starts from the conviction that these problems with the Russellian view are very serious, and from the hunch that we can discover the true nature of indefinites by looking at just those cases that the Russellian view finds problematic. My strategy will be to focus on sentences that exhibit quantificational variability. I will argue that, by examining these sentences alone, we can conclude a great deal about what kind of interpretation we assign to *a pin*, *a percussionist*, or *a cyclops*. In the end, I will suggest that the view of indefinites that we are led to when we ask how indefinites give rise to quantificational variability is in fact the view of indefinites that we need to explain how indefinites get “specific” readings. The idea that indefinites plainly reveal their true nature in quantificational variability sentences is a heresy with a precedent. Kamp 1981 and Heim 1982 also felt that quantificational variability sentences offered important clues to the proper analysis of indefinites. Their concerns were broader than mine, but they developed their brands of Discourse Representation Theory partly with this idea in mind.

Be warned. Through most of the thesis, I will brazenly ignore sentences of the kind that Russellians might use to argue for *their* view, sentences that *do* seem to express existential claims. Maybe this is irresponsible. Still, this work is only the first step in an account of how sentences with indefinites get interpreted, and as far as first steps are

concerned different people will have different views of what is important. Russellians will think that the central sentences to consider are the sentences that express existential claims. I think that it is only by looking at the other sentences first that we can start to exorcise the ghost.

2. The main point

The point of this thesis is that indefinites have properties of the kind that are frequently attributed to definite descriptions. Specifically, they carry a uniqueness presupposition.

What the indefinite determiner does, I will argue, is this. It takes a predicate (such as the property of individuals that *percussionist* describes) and a *situation* (something I will clarify shortly) and it picks out the *unique* individual in that situation who satisfies that predicate (for instance, the *unique* individual in that situation who is a percussionist). That individual is the individual that we are talking about when we use the indefinite (*a percussionist*). If there is no such individual, then it is simply inappropriate to use the indefinite determiner.

Now, even if an expression picks out a single individual, we can of course use it to talk about a range of individuals. The expression just has to contain a dependency on a quantifier. For instance, on assumptions that many subscribe to, the expression *his best friend* denotes a single individual, but, in a quantificational sentence like (10b) this expression may contain a dependency on the quantifier (i.e. *his* may be a bound variable), and accordingly *his best friend* may pick out a different person for each individual that the quantifier ranges over.

- (10) a. John discovered that his best friend had mysteriously vanished.
b. Every student discovered that his best friend had mysteriously vanished.

This is what happens in constructions that exhibit quantificational variability. Quantifiers like *usually* and *always*, I assume, quantify over *situations*. In constructions that exhibit quantificational variability, the situation argument of the indefinite is a variable that the quantifier binds, and so the indefinite picks out a different individual for each situation that the quantifier ranges over. In a sentence like (11) (= (6a)), for example, the expression *a percussionist* picks out a different percussionist for each situation that *usually* ranges over. Accordingly, (11) expresses the claim that most situations are such that the unique percussionist in that situation is hard of hearing. (A moment's thought will reveal that this is not enough to explain why (11) seems to say that *most* percussionists are hard of hearing. But this is one component of the explanation.)

- (11) A percussionist is usually hard of hearing.

To be more explicit, my proposal is that the lexical entry of *a* specifies what I have written in (12). It says that the denotation of *a* (written $[[a]]$ -- more below about what I am calling a *denotation*) is a function that, given a situation, yields a function from predicates of individuals to individuals. The function is only defined when the situation contains a unique individual that satisfies the predicate; this definedness condition expresses the idea that the determiner carries a uniqueness presupposition.

- (12) *Singular indefinite determiners.*

Singular indefinite determiners apply to two arguments, the first of which is a situation and the second of which is a predicate of individuals.

[[a]](s)(P) is defined only if there is a unique individual c in s such that $P(c) = 1$. Where defined, its value is that individual.

I will argue for this proposal by arguing that quantificationally variable indefinites have this lexical entry. In closing, I will argue briefly that this entry also accounts for the other “problematic” indefinite, the specific indefinite. As I mentioned above, I am not going to concern myself here with sentences that seem to fall in nicely with the traditional Russellian view of indefinites. I will leave this task for future research. In the best case, we will find that, in these sentences too, indefinite determiners must have the lexical entry in (12), and that something other than the indefinite is responsible for the fact that the sentence makes an existential claim. (For instance, these sentences might contain a covert existential quantifier over situations, one that binds the situation argument of the indefinite determiner.) In the worst case, we will be forced to concede that there is something after all to the Russellian view: in the absolute worst case, we will have to say that singular indefinite determiners are essentially ambiguous between a reading that the lexical entry in (12) captures, and a Russellian reading under which they indeed are existential quantifiers.

3. Outline of the dissertation

Here, in brief and too sketchy terms, is the plan.

In Chapter 2, I will argue that indefinite determiners carry a uniqueness presupposition. I will do so by showing that, once we grant that they carry this presupposition, we can explain how it is that quantificational variability arises. The important components of the explanation are these. First, adverbial quantifiers (quantifiers such as *usually* or *always*) quantify over *situations*. Second, the uniqueness

presupposition that the indefinite carries tells us that every situation in the quantifier's domain contains a single percussionist (say). Third, additional default strategies that we use in identifying the quantifier's domain insure there is a one-to-one mapping between situations in the quantifier's domain and percussionists.

In Chapter 3, I will argue for another aspect of the lexical entry in (12). I will argue that indefinite determiners select for an argument that is of the type of situations. I will argue for the selectional requirement by arguing that, in certain constructions that contain an adverbial quantifier, there is no other position for the quantifier to bind. The bulk of this chapter is devoted to explaining *why* there is no other position for the quantifier to bind. I assume that if the quantifier were to bind the s-position of the matrix predicate, it would be interpreted just like a temporal modifier containing a determiner quantifier, and show that this would incur a pragmatic violation.

In Chapter 4, I will argue against alternative accounts of quantificational variability. There are two kinds of alternatives, both of which incorporate views of indefinites different from mine. On the one hand, there are alternatives under which adverbial quantifiers range over individuals, and indefinites furnish restrictors to these quantifiers. On the other hand, there are alternatives under which adverbial quantifiers range over minimal elements of a set of situations, and indefinites are existential quantifiers. I argue that the analysis of quantificational variability that I presented in Chapter 2 is superior to both kinds of alternatives, and consequently that my view of indefinites is to be preferred.

I will conclude much too quickly. I will touch on promising aspects of my analysis -- in particular, that the lexical entry in (12) seems appropriate for specific indefinites as well. But I will also touch on the problems that it faces -- in particular, we

now have the challenge of explaining how indefinites differ from definites. Time constraints have prevented me from presenting this material at any length, but I intend going into much more detail in the version of this thesis that I will circulate.

4. Some assumptions

It is worth going through some of the assumptions that I will be making in this dissertation. I had hoped to discuss them in more detail, and to try and elucidate the ideas behind them, but, again due to time constraints, I haven't been able to realize my plan, and I hope that the following sketchy outline will be intelligible. Again, I will remedy this in the version of the thesis that I will circulate and distribute.

Ontological assumptions first. In the spirit of David Lewis, I will assume that we conceptualize possibilities in terms of possible *worlds*. *Situations* (following Kratzer 1989) are parts of worlds. (A world is a maximal situation.) Unlike Kratzer 1989, I will assume that there is an essential distinction to be made between situations and individuals. Situations may contain individuals and in fact a situation may contain nothing other than an individual, but an individual is not itself a situation.

I am assuming that associated with every linguistic expression is a *logical form*. Logical forms are trees derived from syntactic trees by certain systematic operations (cf. Heim and Kratzer (forthcoming)). Every node X in the tree has a *denotation*, or *semantic value*, $[[X]]$.⁶ (For short, I will speak of linguistic expressions as having denotations.)

⁶ More properly, it has a denotation *with respect to an assignment of values to variables*. This matters in the case of pronouns, for instance, which have different denotations depending on what assignment they are evaluated with respect to. Throughout the thesis, purely as a matter of convenience, I will ignore the fact that denotations are really denotations with respect to an assignment. However, if I wanted to discuss the semantics of pronouns or of variable binding more seriously, I would have to talk about assignments.

Denotations are heterogeneous in kind, but essentially they are objects that convey what contribution an expression makes to the truth conditions of a sentence. The denotations of sentences, I will assume, are functions from situations to truth values (0 and 1). In other words, they are predicates of situations. In using a sentence we typically claim that its denotation, when applied to some situation that we imagine to be under discussion, yields the truth value 1, i.e. *true*. (I will refer to the situation that is under discussion as the *situation of utterance*. One of its properties is that it contains the interlocutors.) I assume that the denotation of a non-terminal node at logical form is predictable from the denotations of its daughters.⁷ This is why, to the extent that the denotation of any node at logical form contributes to the denotation of the sentence that contains it, we can view denotations as contributions to the truth conditions of a sentence.

Here are some more assumptions about the kinds of denotations that different syntactic categories have. Common nouns like *percussionist*, I will assume, are predicates of individuals: they are functions from individuals to truth values. Verbs, and clausal predicates in general, select for situations and individuals. They are functions that, given a situation, yield a function from individuals to truth values. I will assume moreover that verbs say that the individual that they select for has some property *for the entire duration of the situation they select for*. For instance, the lexical entry of *yawn* specifies that $[[\text{yawn}]]$ is a function that, given a situation, yields a function from individuals to truth values. It says that for any s, x , $[[\text{yawn}]](s)(x) = 1$ iff x occupies the situation s and yawns for the entire temporal duration of s .

⁷ And in general that, given the denotations of two sister constituents, one obtains their mother's denotation either by functional application or by predicate modification (cf. Heim and Kratzer (forthcoming)).

As I mentioned, adverbial quantifiers (such as *usually*) quantify over situations.⁸ They are functions that, given one predicate of situations (i.e. one function from situations to truth values, the kind of thing that a sentence denotes), yield a function from predicates of situations to truth values. Tense, I will assume, selects for a situation and a predicate of situations (i.e. the kind of thing that a sentence denotes).⁹ It's a function that, given a situation, yields a function from predicates of situations to truth values. The lexical entry for the past tense morpheme, for example, specifies that for any s, p , $[[\text{PAST}]](s)(P) = 1$ iff there is some s' such that s' is located temporally prior to s and such that $p(s') = 1$. The lexical entry for the present tense morpheme specifies that for any s, p , $[[\text{PRES}]](s)(P) = 1$ iff there is some s' such that s includes s' and such that $p(s') = 1$.

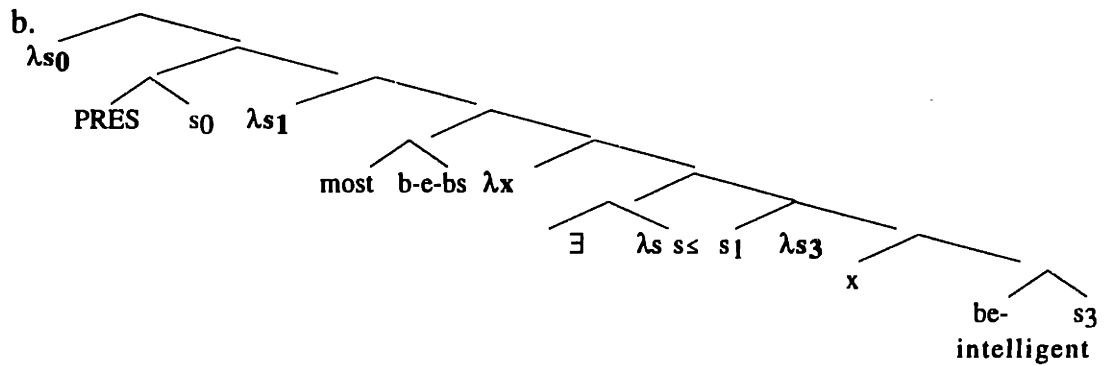
Finally, some remarks about the properties of logical forms. I assume (in essence following Ogihara 1996) that in the mapping from syntactic trees to logical forms, an existential quantifier over situations is inserted at the VP level. This existential quantifier quantifies over parts of the situations that satisfy the second argument of tense. I also assume that at the level of logical form one may freely insert objects that are interpreted as abstracting over positions occupied by variables. Evoking the lambda notation for functions, I will write these objects as $\lambda x, \lambda y, \lambda s$, etc. Here, then, is a sample logical form, a slightly simplified version of a logical form that I use in Chapter 2. Note that, among other abstractors, there is one λs_0 inserted at the root node that transforms the sentence into a function from situations to truth values.

⁸ In light of examples such as (i), I probably have to assume as well that some quantifiers are more selective than others about the situations that they can quantify over, and that there is some sortal restriction on the situation argument of the indefinite determiner that is incompatible with binding by *twice*. I will ignore this in my discussion.

(i) #*Twice, a blue-eyed bear was intelligent.*

⁹ In this I am roughly following Ogihara's (1996) general picture. He uses time intervals rather than situations, however.

(13) a. Most blue-eyed bears are intelligent.



I will not go through the steps of computing the denotation of (13) and, but it comes out to be the following function: $[[[(13b)]](s) = 1$ iff there is some s' such that s' includes s and for most individuals x such that x is a blue-eyed bear, there is some situation s'' contained in s' such that x is intelligent for the full duration of s'' .

Chapter 2.

Indefinites and quantificational variability: An argument for a uniqueness presupposition

1. The phenomenon

This chapter is about a well known puzzle. Sometimes an indefinite appears to inherit quantificational force from an adverbial quantifier in the same sentence. The sentences in (1), for instance, seem to convey pretty much the same thing as the sentence in (2).¹⁰ The sentences in (1) contain an adverbial quantifier (*usually, most of the time*). The sentence in (2) contains a determiner quantifier (*most*) with arguably the same quantificational force.

- (1) a. A blue-eyed bear is usually intelligent. (von Stechow 1994)
b. Most of the time, a blue-eyed bear is intelligent.

- (2) Most blue-eyed bears are intelligent.

This phenomenon is known as *quantificational variability*.¹¹ We can duplicate it with many other adverbial quantifiers. Quantificational variability clearly surfaces with quantifiers that describe a proportion, such as *always* or *roughly half the time*. It also

¹⁰ Sentences that express generalizations about animals with a certain eye color, and especially about bears with blue-eyes, have a long tradition in the literature. I am not sure what the first reference to bears with blue eyes is. The earliest reference to blue-eyed animals that I am aware of is in Carlson 1977 (in this case, the animals are wolves).

¹¹ The term is due to Berman 1987.

surfaces with quantifiers such as *sometimes*¹² and with quantifiers such as *frequently* and *seldom* whose apparent determiner counterparts (*many* and *few*) can convey vague cardinality information. Von Stechow 1996 lists the correspondences in (3)-(7) as further examples of quantificational variability. The (b) sentences, which contain determiner quantifiers, seem to be adequate paraphrases of the (a) sentences, which contain adverbial quantifiers.

- (3) a. A blue-eyed bear is always intelligent.
b. All blue-eyed bears are intelligent.
- (4) a. A blue-eyed bear is often intelligent.
b. Many blue-eyed bears are intelligent.
- (5) a. A blue-eyed bear is sometimes intelligent.
b. Some blue-eyed bears are intelligent.
- (6) a. A blue-eyed bear is seldom intelligent.
b. Few blue-eyed bears are intelligent.
- (7) a. A blue-eyed bear is never intelligent.
b. No blue-eyed bears are intelligent.
- (8) *Schema.*

¹² More complicated adverbial quantifiers such as *occasionally* and *every once in a while* also can appear in sentences of the kind in (1), although these do not have determiner counterparts. Intuitively, the adverbial quantifiers that I am concerned with all evoke the idea of a *sampling*. I am going to ignore this shade of meaning throughout, and I feel that I can do so without adverse consequences. With luck, I have a chance at telling the truth and nothing but the truth even if I know that I'm not telling the whole truth.

a. A *P* is δ -often *Q*.

or: δ of the time, a *P* is *Q*.

b. δ *P*s are *Q*.

The puzzle is why quantificational variability arises. Why do we see these sentences with adverbial quantifiers and their counterparts with determiner quantifiers as equivalent? And in particular, given that we have a gut feeling that adverbial quantifiers tend to quantify over things that we would loosely and pretheoretically describe as occasions or situations or instances, how does it come about that *these* adverbial quantifiers effectively quantify over individuals?

In this chapter, I will argue that the key to this puzzle is that the indefinite determiner carries a uniqueness presupposition. Here is the idea, in a nutshell. (Of course, the abbreviated summary includes a lot of hand-waving and unstated assumptions.)

If we want to know why a sentence like *A blue-eyed bear is usually intelligent* seems to convey that most blue-eyed bears are intelligent, the crucial thing that we have to understand about the sentence is what *usually* quantifies over. My starting point is to say that *usually* quantifies over situations (parts of worlds) -- it says that most situations of one kind are situations of another kind -- but that *which* situations it ranges over is something that we typically rely on pragmatics to work out. That we use pragmatics to work out the domain of *usually* is not an original idea, and it shouldn't be surprising, either. If somebody sees me trying unsuccessfully to open the door to the linguistics library, and says

(9) 5-3-1 usually works.

I know what he is trying to convey -- even though the sentence itself says nothing about occasions when one is trying out possible combinations to the library door. So this is the first point: the meaning we give to sentences like *A blue-eyed bear is usually intelligent* depends on the domain we identify for *usually*, and how we identify the domain of *usually* is a matter of pragmatics.

Now, if we have to evaluate a sentence with an adverbial quantifier and the context itself does not provide any information about the situations that the quantifier ranges over, we are not necessarily at a loss. That is because we may be able to get clues from the sentence itself. Suppose someone tells you that

(10) That archer never misses.

Material in this sentence is enough to suggest that *never* quantifies over situations that include (or directly follow) moments when the archer shoots an arrow with the intention of hitting a target. (I will discuss this example in slightly more detail later on.) My claim is that quantificational variability sentences like *A blue-eyed bear is usually intelligent* are essentially similar to (10), and that the crucial clue in the sentence that enables us to recover a domain of quantification is the uniqueness presupposition of the indefinite. What we learn from the uniqueness presupposition of the indefinite is that *every situation in the domain of quantification contains a unique blue-eyed bear*. With this information, however, it is easy to identify a domain of quantification that consists of situations each of which contains a different blue-eyed bear. And, crucially, quantifying over situations in this domain is *just like quantifying over blue-eyed bears*. If you have a set of situations

that each contain a different blue-eyed bear, and you say that in most of these situations the unique blue-eyed bear in the situation is intelligent, that is just like saying that most blue-eyed bears (that appear in these situations) are intelligent. So this is the second point: the uniqueness presupposition of the indefinite allows us to identify a set of situations that *usually* ranges over, and quantifying over the elements of this set has the same effect as quantifying over blue-eyed bears. In other words, quantificational variability falls out from the way in which the uniqueness presupposition of the indefinite constrains the domain of *usually*.

In my opinion, this account of quantificational variability provides the strongest argument that the lexical entry for the indefinite is as in example (12) in the introduction to the thesis. As I mentioned in the introduction, however, there are other theorists who are just as eager to claim that constructions of the kind that exhibit quantificational variability are the constructions where indefinites reveal their true colors most flamboyantly, and they have come to different conclusions. I will address their alternatives in Chapter 4.¹³ I should note that my solution for quantificational variability relies heavily on the insights and analysis of von Stechow 1994, 1996. Von Stechow stresses that the domain of an adverbial quantifier is determined by pragmatics, and also takes the view that adverbial quantifiers quantify over situations (parts of worlds). He also seeks to explain quantificational variability by guaranteeing that the situations that an adverbial quantifier ranges over each contain a *unique* individual of the kind the indefinite's nominal predicate picks out (e.g. a *unique* blue-eyed bear), and each contain a *different* such individual. However, von Stechow's actual explanation is significantly different from mine -- as is his view of indefinites. In Chapter 4, I shall comment on his kind of approach as well.

¹³ Though I will limit myself in Chapter 4 to the discussion of sentences without *when-* or *if-* adverbials, and consequently will not touch on the issues of anaphora that were an important motivation for these theories.

2. The explanation

2.1. Preliminary technicalities

In this section, I will show how it is that a sentence like (11) comes to express roughly the same thing that a sentence like (12) does.

(11) A blue-eyed bear is usually intelligent.

(12) Most blue-eyed bears are intelligent.

I will assume that adverbial quantifiers have the simple lexical entry in (3), which is parallel in all respects to the lexical entries that one standardly assumes for determiner quantifiers. Adverbial quantifiers relate two predicates -- predicates of situations -- and say that a certain proportion of situations that satisfy the first predicate satisfy the second.

(13) *Adverbial quantifiers.*

Adverbial quantifiers apply to two arguments, each of which is a predicate of situations.
(Where defined.)

$[[\text{ADV-Q}]](p_s)(q_s) = 1$ iff δ situations s such that $p_s(s) = 1$ are such that $q_s(s) = 1$. (Where δ is a proportion that depends on the adverb in question.)

My purpose is to show that, if we also assume the lexical entry in (14) for the indefinite determiner, equivalences like the one between (11) and (12) follow on a minimum of further assumptions.

(14) *QV indefinite determiners.*

QV indefinite determiners apply to two arguments, the first of which is a situation and the second of which is a predicate of individuals.

$[[a]](s)(P)$ is defined only if there is a unique individual c in s such that

$P(c) = 1$. Where defined, its value is that individual.

Those further assumptions, of course, are not to remain unexamined; I will spend the rest of the chapter discussing them.

Before beginning, however, here are some technicalities about the logical forms that I will be assuming.

First of all, to make the presentation easier, I am going to consider logical forms that are simpler than the logical forms that I imagine sentences like (11) actually to have. Afterwards, I will indicate some of the embellishments that have to be made in the logical forms. These embellishments will not affect my general story. The main simplification is this. I will assume temporarily that sentences like (11) are truth-value denoting expressions, and therefore I will temporarily consider as the logical form of (11) something that constitutes a piece, more or less, of the logical form that I imagine (11) actually to have (a piece that does not contain an abstractor over situations at the top, or a variable over situations in the first argument of the quantifier). Accordingly, I will also assume that *intelligent* is interpreted simply as a predicate of individuals (rather than a function that yields a set of individuals given a situation). I will also make vastly simplifying assumptions about the kinds of interpretations that objects at logical form get. I will assume that all objects are restricted in their interpretation so that we only use them to make claims about the actual world. All situation-denoting expressions denote situations in the

actual world, all individual-denoting expressions denote individuals in the actual world, all predicates of individuals apply successfully only to individuals in the actual world.

Second of all, I assume that, at the level of logical form, the sister of *usually* is an anaphor. In my logical forms, I will call this anaphor P_s , to indicate that its value is a predicate of situations.¹⁴ So the (simplified) logical form of (11) is:

(15) usually P_s [λs_1 [a s_1 b-e-b] intelligent]

It is worth saying a few words about P_s here. P_s is a *resource domain variable* in the sense of Westerståhl and von Fintel, an implicit argument that is present at logical form, that satisfies the selectional requirement of *usually*, and that is interpreted via an assignment in the same way that pronouns are. In this case, P_s tells us what the domain of quantification of *usually* is.¹⁵ Putting a resource domain variable in the syntax is one way of expressing the fact that quantification is contextually restricted. That quantification is contextually restricted is an old observation (dating at least as far back as Boole 1854, according to Kratzer): normally, when one utters a sentence like *Everyone showed up at the party last night*, one does not intend to make a claim about everyone in the world, but rather about everyone in some contextually restricted set of people. That contextual restrictions are encoded at the level of logical form (Westerstahl) and that the elements that encode them are interpreted in the same way that overt anaphors like *him* are (Rooth 1992, von Fintel 1994) is a new idea. I will be assuming throughout that the predicate of situations that corresponds to the domain of quantification of an adverbial quantifier is

¹⁴ Still, this anaphor is just a variable of the type of predicates of situations, and any label for a variable would do.

present at logical form, even if not pronounced. I also assume that resource domain variables that stand for predicates of individuals may appear at logical form as sisters to other predicates of individuals, in which case they are interpreted as conjoined with those predicates. In cases where the predicates that they are conjoined with serve to restrict determiner quantifiers, these resource domain variables will have the function of further restricting the quantifier. For instance, a sentence like *Every student showed up at the party last night* might include the constituent [*every* [F_x *student*]], where F_x is a resource domain variable. In my simplified logical forms here, I will always write in the resource domain variable that provides the first argument of *usually*, but I will only make use of the one that is conjoined with predicates where doing so serves to make an additional point. The important thing to bear in mind is this. If sentences like (11) and (12) contain covert anaphors, to say that the two are equivalent is really to say that the two are equivalent *on natural ways of resolving these anaphors*.

A final point about how the context makes available antecedents for anaphors like P_s and F_x . I assume that the context can make salient sets of situations or sets of individuals. Once this happens, there is some automatic process that makes the characteristic functions of these sets available as possible antecedents for anaphors. So, when a quantifier's domain is contextually restricted, this happens because of a two-step process: first, the context makes salient some set; then, a resource domain variable that is interpreted as restricting the quantifier takes as its value the characteristic function of this set.

Now on with the explanation.

¹⁵ I should note that the assumption that resource domain variables are present at logical form is an assumption that I am making for convenience, and I am sure one could construct a similar account on which the interpretation of a quantifier like *every* or *usually* is itself sensitive to context.

2.2. The origin of quantificational variability.

To say that (11) expresses the claim that most (relevant) blue-eyed bears are intelligent is to say that the value of (15) is true (i.e. $[[(15)]] = 1$) only when most (relevant) blue-eyed bears are intelligent. What *are* the truth conditions of (15)? By looking at the lexical entry for the adverbial quantifier in (12), we can see that, where defined, (15) will be true as long as most situations s such that $P_s(s) = 1$ are such that $[\lambda s, [a s, b-e-b] intelligent] (s) = 1$. (I take the quantificational force of *usually* to be the same as that of *most*.) By looking at the lexical entry for the indefinite in (13), we can see that $[\lambda s, [a s, b-e-b] intelligent] (s) = 1$ iff there is a unique blue-eyed bear in s who is intelligent (and is undefined if there is no unique blue-eyed bear in s). So in other words, where defined, (15) will be true as long as most situations of which P_s holds contain a unique intelligent blue-eyed bear:

(16) Where defined, $[[(15)]] = 1$ iff for most s such that $[[P_s]](s) = 1$, there is a unique blue-eyed bear in s -- call him U_s -- and U_s is intelligent in s . ((13), (14))

On the surface, these truth conditions don't seem to give us exactly what we want. What we would like is for the truth conditions of (15) to be the same as the truth conditions for a sentence like (12). However, there is no direct relation between the truth conditions in (16) and the truth conditions that we compute from the logical form of the sentence in (12). One possible (simplified) logical form for (12) is:

(17) [[most [b-eb]] intelligent]

And this is true as long as most blue-eyed-bears are intelligent:

(18) $[[\text{(17)}]] = 1$ iff for most x such that x is a blue-eyed bear, x is intelligent.

But actually this is not as big a problem as it seems. It is only if P_x can be anything at all in (11)/(15) -- if there are no constraints at all on what situations we are quantifying over when we use a sentence like (11) -- that (11) and (12) do not make the same claim.

Suppose that the value of P_x is not completely unconstrained. Suppose, for instance, that we *could guarantee* that there is a one-to-one mapping between situations that we are quantifying over in (11)/(15) and blue-eyed bears. Suppose we could guarantee that every situation of which P_x holds contains exactly one blue-eyed bear, and that every blue-eyed bear is contained in exactly one situation of which P_x holds.¹⁶ Then it would follow that (11)/(15) and (17) are true under exactly the same conditions.

In fact, I claim, the value of P_x is *not* completely unconstrained, and, as a result, sentences like (11) will effectively have the same truth conditions as sentences like (12). (This statement actually deserves qualification -- they will have the same truth conditions *in all cases that we typically consider* -- and this is something that I will go into below.) Moreover, the uniqueness presupposition that the lexical entry in (14) encodes plays a crucial role in determining that P_x is constrained in the way it is. The uniqueness presupposition of the indefinite thus bears a large part of the responsibility for quantificational variability. I am now going to indicate how the value of P_x is constrained, and accordingly how it comes to be that sentences like (11) express quantification over

¹⁶ I will occasionally refer to a situation of which P_x holds as a P_x -situation.

individuals. But first a few words about the general picture that I have in mind -- in more detail than I presented it in the introduction .

The general picture is this. When we hear a sentence like (11), we know automatically that P_s is constrained to take certain values. We know this on the basis of the uniqueness presupposition, as I shall explain. When we have no further information about the identity of P_s , and we wish to evaluate the sentence, we use other interpretive strategies in order to identify a suitable P_s -- interpretive strategies that we are able to apply because we already have the information that the uniqueness presupposition gives us. Applying these strategies means imposing further restrictions on P_s , so that we can more easily identify a value for it. Once we narrow down the possible values for P_s in this way, we wind up with a P_s whose characteristics are such that the entire sentence is equivalent to a sentence like (12). The broader claim, then, is that a sentence like (11) only seems to express quantification over individuals *because* of strategies that we use when we do not have enough information to identify a suitable P_s . When we do not have enough information to identify a suitable P_s , we are not able to construct a meaning for the sentence and so evaluate its truth. If we need to evaluate the truth of the sentence and we don't have enough information to identify a suitable P_s , we do whatever we can to help us find one, and this might mean imposing further restrictions on the possible value of P_s . Typically, when we evaluate sentences like (11), we do not have enough information to identify a suitable value for P_s , and by doing whatever we can to find one, we eventually come up with a meaning for the sentence that expresses quantification over individuals. A corollary, of course, is that, when we are able to identify a suitable value for P_s without taking extraordinary measures, the sentence may not end up expressing quantification over individuals, and this is something I will take up later on. One final remark. The general picture that I have presented implies something about the use of sentences like (11) that is at

least at first blush a little bizarre. It implies that when we use sentences like (11) to convey quantification over individuals (as we generally do), we are proceeding on the understanding that the context does not furnish a suitable P_s . A speaker who uses a sentence like (11) to convey quantification over individuals is thus playing an elaborate game: he is aware of the fact that his utterance is strictly speaking inappropriate given the context of conversation and relying on the listener's emergency equipment to render the sentence useful. I will nonetheless take it for granted that this is happening, and I will have no more to say about it here.

With this general picture hovering in the background, here are the constraints on the value of P_s , how they arise, and how it follows that (11) expresses the claim that most (relevant) blue-eyed bears are intelligent.

First of all -- and most importantly in connection with my analysis of indefinites -- the uniqueness presupposition of the indefinite determiner imposes a constraint on P_s by virtue of the way presuppositions project in quantified constructions. Specifically, it imposes the constraint that *every situation of which P_s holds must contain a unique blue-eyed bear*. I assume that, in quantified sentences, presuppositions project in the way that Karttunen 1974 (and subsequently Karttunen and Peters 1979, Heim 1983, and many others) thought they did. Karttunen and his theoretical descendants thought that, in quantified constructions, presuppositions that project from the scope of the quantifier have universal force. Their view, in informal terms, was this. (An example follows.) Suppose a sentence that says that some individual has property S carries the presupposition that the individual in question has property S^* . Take a sentence that says that some proportion of individuals with property R have property S . This second sentence will carry the presupposition that *every* individual with property R has property S^* . For example, given

that the sentence *Norway cherishes its king* presupposes that Norway has a king, their view was that presuppositions characteristically project in such a way that a sentence like *Most Scandinavian countries cherish their king* will presuppose that every Scandinavian country (in the domain of quantification) has a king. Loosely speaking, every element in the domain of the quantifier must satisfy the presupposition of the scope. Let us make this a little more concrete to see how we wind up in (11)/(15) with the constraint that all P_s -situations must contain a unique blue-eyed bear. If, to express the fact an expression triggers a presupposition, we write a definedness condition on the semantic value of that expression, then we can write:

(17) *Presupposition projection in quantified constructions*

Consider a quantifier Q that combines with two arguments, R and S .

$[[Q]]([[R]])([[S]])$ is defined only if every item x such that $[[R]](x) = 1$ is such that $[[S]](x)$ is defined.

This means that, to the lexical entry for adverbial quantifiers in (18a) (= (13)), we can add the definedness condition in (18b):

(18) *Adverbial quantifiers.*

a. Where defined, $[[ADV-Q]](p_s)(q_s) = 1$ iff δ situations s such that $p_s(s) = 1$ are such that $q_s(s) = 1$. (Where δ is a proportion that depends on the adverb in question.)

b. $[[ADV-Q]](p_s)(q_s)$ is defined only if every situation s such that $p_s(s) = 1$ is such that $q_s(s)$ is defined.

And *this* means that to the truth conditions for (15) in (19a) (= (16)), we can add the definedness condition in (19b):

- (19) a. Where defined, $[[[(15)]]] = 1$ iff for most s such that $[[P_s]](s) = 1$, there is a unique blue-eyed bear in s -- call him U_s -- and U_s is intelligent in s .
- b. $[[[(15)]]]$ is defined only if every situation s such that $[[P_s]](s) = 1$ is such that $[[[\lambda s, [a s, b-e-b] intelligent]]](s)$ is defined.

But , for any s , $[[[\lambda s, [a s, b-e-b] intelligent]]](s)$ is defined only if $[[a]](s)([[b-e-b]])$ is defined, and, from the lexical entry for indefinite determiners in (14), we can see that, for any s , $[[a]](s)([[b-e-b]])$ is defined only if there is a unique blue-eyed bear in s . So this means that we can revise (19) as:

- (20) a. Where defined, $[[[(15)]]] = 1$ iff for most s such that $[[P_s]](s) = 1$, there is a unique blue-eyed bear in s -- call him U_s -- and U_s is intelligent.
- b. $[[[(15)]]]$ is defined only if every situation s such that $[[P_s]](s) = 1$ is such that *there is a unique blue-eyed bear in s* .

In other words, we can only evaluate (11)/(15) if every situation of which P_s holds contains a single blue-eyed bear.

So, once we make the fairly standard assumption that quantified constructions give rise to universal presuppositions, we derive that (11)/(15) is true only if all P_s -situations contain a unique blue-eyed bear and, for most P_s -situations, the unique blue-eyed bear in that situation is intelligent. (This is by vacuously adding the definedness conditions in (20b) to the truth conditions in (20a), as I do in (21) below.)

- (21) $[[(15)]] = 1$ only if for every s such that $[[P_s]](s) = 1$, there is a unique blue-eyed bear in s , and, for most s such that $[[P_s]](s) = 1$, the unique blue-eyed bear U_s in s is intelligent.

There is another assumption that we need to achieve the result that (11)/(15) is equivalent to a sentence of the form *Most blue-eyed bears are intelligent* -- and that any sentence of the form *ADV-Q [a NP] VP* is equivalent to a sentence of the form *[DET-Q NP] VP* (where the adverbial quantifier and the determiner quantifier have the same force). This assumption is that no two P_s -situations contain the same blue-eyed bear (or more generally that no individual of whom the NP property holds is in two P_s -situations). Notice that I am calling it a default assumption. The idea, recall, is that we apply this assumption as part of a strategy to identify a value for P_s when none is readily available, but when we know enough to know that every P_s -situation contains a unique blue-eyed bear.

- (22) a. *Default assumption.*

In evaluating sentences of the form $[[ADV-Q [P_s]] [\lambda s [[a s NP] VP]]$,
assume:

$$\sim \exists s_1, s_2, x \quad [[P_s]](s_1) = 1 \ \& \ [[P_s]](s_2) = 1 \ \&$$

$$x \text{ is in } s_1 \ \& \ x \text{ is in } s_2 \ \&$$

$$[[NP]](x) = 1.$$

- b. *Default assumption as applied to (11)/(15) :*

For any two situations s_1, s_2 such that $[[P_s]](s_1) = 1 \ \& \ [[P_s]](s_2) = 1$,

the unique blue-eyed bear U_{s_1} in s_1 is distinct from the unique blue-eyed bear

U_{s_2} in s_2 .

What does this assumption do for us? It tells us that (11)/(15) is true only if most blue-eyed bears that appear in a P_s -situation are intelligent. Here is another way of putting it.

Collect all the individuals that appear in a P_s -situation and put them in the set $I^P = \{x: \exists s [x \text{ is in } s \ \& \ \{[P_s]\}(s) = 1]\}$. Then it follows from (21) and (22) that (11)/(15) is true only if most blue-eyed bears in I^P are intelligent.

(23) $\{[(15)]\} = 1$ only if, for most x such that $\{[b-e-b]\}(x) = 1$ and $x \in I^P$, x is intelligent.

We are now nearly done, but not quite. Our goal was to account for the fact that we generally regard sentences like *A blue-eyed bear is intelligent* ((11)) and *Most blue-eyed bears are intelligent* ((12)) as equivalent. As yet, this does not follow from our assumptions -- recall that I am assuming that the sentence *Most blue-eyed bears are intelligent* has the logical form in (24b) and truth conditions in (24c).¹⁷

¹⁷ Nor does it follow from our assumptions that a sentence with the logical form in (i a) is true. F_x in (i a) is a resource domain variable of the kind that I mentioned earlier: it is a predicate that is interpreted as conjoined with the nominal predicate, and serves to further restrict the quantifier.

- (i) a. [[most $\{[F_x][b-e-b]\}$] intelligent]
b. (Where defined), $\{[(i)]\} = 1$ iff for most x such that x is a blue-eyed bear and $\{[F_x]\}(x) = 1$, x is intelligent.

It would follow if in addition to everything I have said so far we could guarantee the following. Suppose we evaluate the sentence *Most blue-eyed bears are intelligent* under the same conditions as the typical conditions under which we evaluate the sentence *A blue-eyed bear is usually intelligent* -- conditions under which we have insufficient information to identify a suitable P_s . Under these conditions, the value that we settle on for P_s is intimately related to the value that we settle on for F_x : $\{[F_x]\}(x) = 1$ if and only if x is in I^P . Then the two sentences would have the same truth conditions. Another way of looking at what I am about to say in the text is that we *are* able to guarantee this on the basis of natural assumptions about discourse antecedents. When we evaluate the sentence *Most blue-eyed bears are intelligent* under the same conditions as those under which we evaluate *A blue-eyed bear is usually intelligent*, we assign a logical form like (i a) to the first sentence, we settle on a value for P_s such that $\{s: P_s(s) = 1\}$ partitions the world, and we settle on a value for F_x such that $\{x: F_x(x) = 1\}$ is the entire set of individuals in the world.

- (24) a. Most blue-eyed bears are intelligent. (= (12))
 b. [[most [b-eb]] intelligent] (= (17))
 c. [[(24b)]] = 1 iff for most x such that x is a blue-eyed bear, x is intelligent. (= (18))

However, it would follow if we could assume *in addition* that every blue-eyed bear is in a P_s -situation.¹⁸ Adopting this additional assumption would give us the one-to-one mapping between P_s -situations and blue-eyed bears that we need: projection of the uniqueness presupposition tells us that every P_s -situation contains a unique blue-eyed bear; the default assumption in (22) together with this additional assumption would tell us that every blue-eyed bear is contained in a unique P_s -situation.

There are a number of directions in which we could proceed. What I suggest¹⁹ is that this assumption too follows from strategies that we use to resolve anaphors. The idea is this. We know that we generate antecedents for anaphors by taking the characteristic function of some contextually salient set of objects. If we need an antecedent but the context makes salient no appropriate set of objects, we try to generate an appropriate set of objects out of something that the context *does* make salient. In this case, we are guided by the knowledge that the set of objects that we have to generate is a set of situations (the set of P_s -situations), and that every situation contains a unique blue-eyed bear, a different bear for each situation. I will assume that one object that the context always makes salient is *the actual world* (a single situation). I will also assume that, if we want to generate out of a

¹⁸ That is:

(i) a. **Additional assumption.**

In evaluating sentences of the form [[ADV-Q [P_s]] [λs [[a s NP] VP]], assume:

$\forall x$ [[NP]] (x) = 1 $\rightarrow \exists s$ [x is in s and [[P_s]](s) = 1]

b. **Additional assumption as applied to (1)/(5) :**

For every x, if x is a blue-eyed bear, then there is some s such that x is in s and [[P_s]](s) = 1.

single object a set of objects of the same kind, and that single object is *made up* of objects of the same kind, one option that we have is to divide up that single object into parts. Suppose then that the way we find an antecedent for P_s is by generating a set of situations that partition the world, and then taking the characteristic function of that set. Then the set of P_s -situations will have the property that their (mereological) sum is the actual world:

$$(25) \quad w = \oplus \{ s: [[P_s]](s) = 1 \}.$$

But if the situations that satisfy P_s partition the world, then together these situations contain all the individuals in the world. As a consequence, they contain all the blue-eyed bears in the world, which was just what we wanted. Look back at (23). If the situations that satisfy P_s partition the world, then the set of individuals that appear in a P_s -situation, the set that we called I^P , is nothing other than the entire set of individuals. (Recall that, on my simplified assumptions, we are ignoring any individual that is not part of the actual world.) So (23) reduces to (26):

$$(26) \quad [[(15)]] = 1 \text{ only if, for most } x \text{ such that } [[b-e-b]](x) = 1, x \text{ is intelligent.}$$

Or, since we are limiting ourselves to cases where $[[(15)]]$ is defined:

$$(27) \quad [[(15)]] = 1 \text{ iff for most } x \text{ such that } [[b-e-b]](x) = 1, x \text{ is intelligent.}$$

which are just the truth conditions that we have in (24) for *Most blue-eyed bears are intelligent*. We are there.

¹⁹ And Uli Sauerland suggested to me (in its essence)

In short, there are a number of ingredients to quantificational variability.

Quantificational variability arises because we give a certain value to the restrictor of an adverbial quantifier when the context is of no help to us in determining what the identity of that restrictor is. We are guided in our search for an appropriate value by sentence-internal information as well as by more general strategies. When we identify a suitable restrictor and evaluate the sentence, because of the information we have used in our search, we will come up with a meaning for the sentence that expresses quantification over individuals. The uniqueness presupposition of the indefinite plays a crucial role in this process: it is the main contributor to the sentence-internal information that we use in searching for a suitable restrictor.

2.3. *Embellishments.*

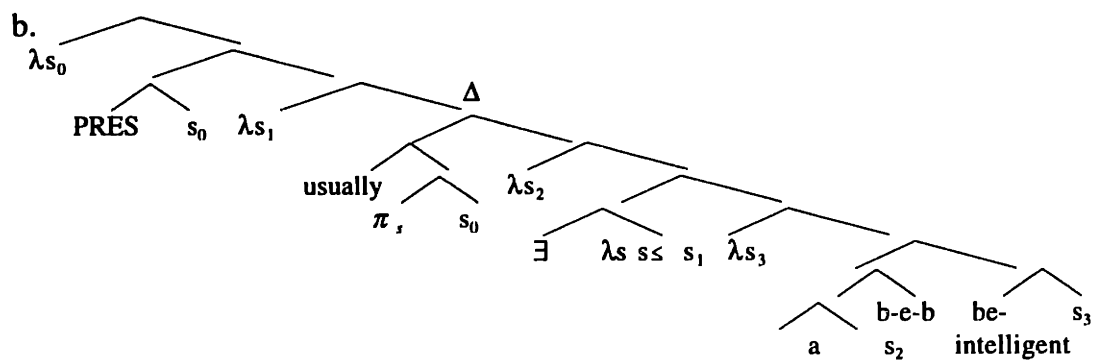
If we drop the simplifying assumptions, the logical forms that we have to deal with become more gnarled and elaborate, and so do their interpretations. However, the basic picture, and the basic steps that we go through in deriving quantificational variability, are the same. I will just give an indication here, and I will note that there is one aspect of quantificational variability that is not so straightforward given the embellishments.

The logical forms are complicated by three things. First of all, there is tense information, and the apparatus that goes with it (lambda operators are inserted so that tense can satisfy its selectional requirements; an existential quantifier over situations and appropriate lambdas are inserted at the VP level, cf. Ogihara). Second of all, because sentences are functions from situations to truth values -- sentences describe properties of the situation of utterance -- a lambda operator that abstracts over the situation argument of tense is inserted as sister to the original root node. Third of all, since *usually* and *most*

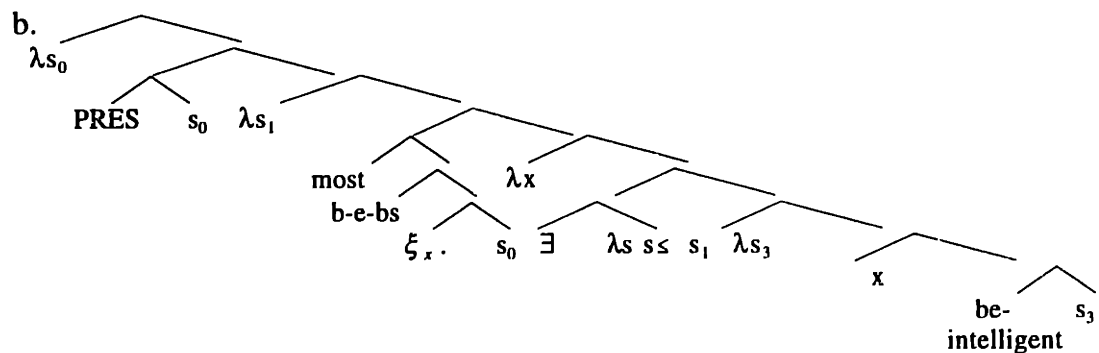
are interpreted as ranging over different sets of objects depending on what the situation of utterance (or at least the world of utterance) is, I take it that somewhere in the restriction of *usually* and *most* is a situation variable bound by the highest lambda abstractor. What I assume is that the resource domain variables that contribute to the restrictors of these quantifiers are complex, and consist of a situation variable and a function from situations to predicates of situations.

All this means that the logical form of *A blue-eyed bear is usually intelligent* is as in (28b) and the logical form of *Most blue-eyed bears are intelligent* is as in (29b).

(28) a. A blue-eyed bear is usually intelligent.



(29) a. Most blue-eyed bears are intelligent.



Now the claim is that (28b) and (29b) turn out to be equivalent because of default strategies that we use in resolving π_x and ξ_x when the context is silent as to their value, but when we are guided by clues to the identity of π_x that (28b) itself gives us. The crucial clue is provided by the presupposition of the indefinite.

The account proceeds roughly as before; I will gloss over some details here. Assuming that for any situation s' , $[[\text{(28b)}]](s')$ is defined only if the constituent labelled with a Δ is defined, we guarantee from the projection of the uniqueness presupposition that, for any situation s' , $[[\text{(28b)}]](s')$ is defined only if every situation in $\{s: [[\pi_x]](s')(s) = 1\}$ contains a single blue-eyed bear. This encourages us to look for a value of π_x such that, given any situation s' , every situation in $\{s: [[\pi_x]](s')(s) = 1\}$ contains a unique blue-eyed bear -- and, by the default assumption, such that each situation in that set contains a different blue-eyed bear. In other words, we look for a value of π_x that takes us from a situation s' to a predicate of situations $P_{s'}$ such that every $P_{s'}$ -situation contains a single blue-eyed bear, and each $P_{s'}$ -situation contains a different blue-eyed bear.

The last step -- guaranteeing that every blue-eyed bear that *most* quantifies over in (29) is in a situation that *usually* quantifies over in (28) -- is definitely more complicated. At its core is a slightly different notion of what kinds of things the context can make salient, and what a context is, and I don't want to get into these issues right now. I hope the following rough translation of my proposal from above is at least a start. The first thing that we need to understand is how a context normally makes available antecedents for anaphors like ξ_x and π_x . Let's just say for now that a context typically makes salient not

sets of individuals, as I said earlier, but rather sets of *pairs*, where one member of the pair is a situation and the other member is a set of individuals. Sets of pairs of this kind are translatable into functions from situations to predicates of individuals, and let's say that it is by this translation that we get an antecedent for anaphors like ξ_x . Likewise, let's just say for now that a context typically makes salient not sets of situations, but rather sets of *pairs*, where one member of the pair is a situation and the other member is a set of situations (say, those situations that are accessible from the first by some criterion). From this, we can get an antecedent for anaphors like π_x . One set that a context always makes salient is the set of pairs of situations and individuals in the world of that situation. This means that, in the absence of any other antecedent for ξ_x , (29a) will say that most blue-eyed bears in the world are intelligent. As for π_x , in the absence of any antecedent, we will try to manufacture one given the guidelines we have: this means putting together a set of pairs of situations and sets of situations each of which contains a different blue-eyed bear. If the easiest discourse entity to construct is a set of pairs of situations *and sets of situations that partition the world of that first situation*, we will have what we want. But this is not something that I know how to argue for. So there is still a small gap in the solution that has to be filled.

For the rest of the thesis, I will be using the terms of the earlier discussion. I will be speaking of contexts as making sets of situations or sets of individuals salient. I will talk as though, when we evaluate a sentence with an adverbial quantifier, we are resolving an anaphor that stands for a predicate of situations. It should be borne in mind that this is shorthand for something more complicated. My hope is that using this shorthand will not mislead me.

3. Examining the assumptions

I have proposed that quantificational variability arises because of the ways in which we try to identify the restrictor of an adverbial quantifier, and I have claimed that it is easy to see how this happens once we assume that the indefinite carries a uniqueness presupposition. The account relies on a notion of what information the sentence itself conveys about the nature of the quantifier's restrictor, and also on a notion of what information we can use in trying to determine the quantifier's restrictor. For instance, I have assumed that, on the basis of the uniqueness condition associated with the indefinite, we can compute that the sentence itself carries a presupposition with universal force. I have also assumed that we can use the knowledge that the sentence has this presupposition in looking for a value for the quantifier's restrictor. At the same time, I have assumed that we can use certain default strategies in looking for the quantifier's restrictor, and in particular I claimed that the requirement that (to take the example that I used above) different P_s -situations contain different blue-eyed bears arises as the result of a default strategy. All of these assumptions I made out to be either uncontroversial or natural. Still, the first two are perhaps not quite as uncontroversial as I pretended, and one could debate the naturalness of the third. So they are worth some discussion.

3.1. *Do presuppositions project as in (17)?*

In my account for quantificational variability, I make crucial use of a particular claim about how presuppositions project in quantified constructions. I assume that quantificational sentences carry *universal* presuppositions. If presupposition projection works in the way I imagine, we can conclude from the fact that the indefinite determiner imposes a uniqueness condition that the sentence *A blue-eyed bear is usually intelligent* presupposes that *every* situation in the domain of quantification contains a unique blue-

eyed bear. This claim is quite crucial to my account, because, on my view, it is the universal presupposition that gives us our first clue as to what the domain of quantification is in quantificational variability sentences.

(To summarize the claim: suppose that when one uses a certain predicate, one presupposes that the individual that the predicate applies to has some property; then, when one uses a quantificational sentence where that predicate constitutes the quantifier's scope, one presupposes that every individual in the domain of quantification has that property. I expressed this as in (30) (= (17)).

(30) *Presupposition projection in quantified constructions*

Consider a quantifier Q that combines with two arguments, R and S .

$[[Q]]([[R]])([[S]])$ is defined only if every item x such that $[[R]](x) = 1$ is such that $[[S]](x)$ is defined.

Now, it is in fact descriptively wrong to say that quantificational sentences *always* carry universal presuppositions. Exceptions are well known. (I will summarize them below.) So, as far as my account in 1.1 goes, I can be rightly accused of covering up some facts. However, the view that quantificational sentences naturally give rise to universal presuppositions has a long and distinguished history (Karttunen 1974, Karttunen and Peters 1979, Heim 1983), and theories have evolved (in particular Heim 1983, and related approaches) that are able to account for many exceptions while maintaining the view that universal presuppositions are somehow natural. On the one hand, these theories predict universal presuppositions in the sentences that I am concerned with. On the other hand, descriptively speaking, I know of no reason for thinking that quantificational variability sentences pattern with those cases where universal presuppositions don't show

up. So I think that I am on safe ground in assuming, at least as an approximation, that quantificational sentences carry universal presuppositions.

So that the reader can judge for himself, however, I will give a summary of what I take to be the facts regarding presupposition projection in quantified sentences. I will then summarize the theory of presupposition projection that I assume for the purpose of this thesis -- while cautiously observing that the issue of how presuppositions project is not a settled one.

The first point is that there seem to be clear cases where universal presuppositions surface. Here is one example, with a scenario based on a scenario from Beaver 1995. Imagine that we are talking about a game of hide-and-seek, that 20 boys were playing the game, and that I know that 16 hid in the living room, and 10 behind the grand piano. I could then truthfully report (31a). This establishes that *them* can in principle take as its antecedent the entire group of boys that *most* ranges over. Now suppose that, of the 20 boys, 16 hid in the living room, and 10 regretted hiding there. I can not truthfully report (31b). Why not? Because there is a universal presupposition. *Regret* is presuppositional -- *John regretted hiding there* presupposes that John hid there. Consequently, the sentence *Exactly half of them* regretted hiding there presupposes that every individual in the domain of quantification of *exactly half* hid there. This means that *them* must take as its antecedent some subgroup of the boys that hid in the living room (the maximal one, in fact, though that follows from something else). But the facts are such that more than half of the maximal subgroup of boys that hid in the living room regretted hiding there. So (31b) would be a false report. (Note that, if 8 of the 20 boys -- exactly half of those that hid in the living room -- regretted hiding there, (31b) would be a true report.)

(31) a. Most of the boys hid in the living room, and exactly half of them hid behind the grand piano.

[20 boys, 16 hide in the living room, 10 behind the desk]

b. Most of the boys hid in the living room, and exactly half of them regretted hiding there.

[20 boys, 16 hide in the living room, 8/ *10 regret it]

How about cases where quantificational sentences do not carry universal presuppositions? On the one hand, there are “denial” sentences. Even if the sentence *John got advice from his sister* presupposes that John has a sister, the sentence in (32) does not presuppose that every student (in the domain of quantification) has a sister. (If it did, the sentence would be contradictory and incoherent, and I take it that the sentence is fine.)

(32) Few students got advice from their SISTER, simply because few students HAD a sister to get adVICE from.

There are also certain quantificational sentences that are like “denial” sentences in that the presupposition trigger appears inside a focused constituent. (So this class could conceivably fall together with the previous one.) Some of the clearest cases are sentences that respond to questions about the entire group of individuals that make up the domain of quantification. B’s response in (33) is appropriate even though he knows (and says explicitly) that not all the faculty have thesis students.

(33) [A enters the department and finds it empty.]

A: Where is everybody?

B: Well, most people in the department are at their thesis students’ graduation

ceremony. The ones who don't have thesis students are here, though.

Finally,²⁰ examples such as the following -- due to Heim 1983 -- have been cited as quantificational sentences in which universal presuppositions fail to surface. However, the example only counts if the indefinite is a quantificational expression (with existential force), and, if the observations of this thesis are correct, the assumption could be unwarranted. (Moreover, it is not obvious what the domain of quantification is in (34): if it contains the fat man alone, it is possible to claim that there is a universal presupposition.²¹)

(34) A fat man was pushing his bicycle.

In the literature, opinions are divided as to how natural universal presuppositions are. A number of different theorists have set themselves the task of explaining why presuppositions project the way they do; while I am not going to undertake a survey of their theories here²², it is important to note that they differ with regard to whether they take it to be *essentially* correct that presuppositions project universally in quantified sentences. Karttunen and Peters 1979 and Heim 1983 were so convinced of it that their systems include separate stipulations that are designed to guarantee universal presuppositions -- Heim 1983 (as we shall see) has a further explanation for why it is that these presuppositions sometimes fail to surface. Beaver 1995 and Krahmer 1995 predict weaker presuppositions (the latter motivated primarily by examples like (34)). So, while I think it is safe to assume that, in quantificational variability sentences, presuppositions project in

²⁰ Beaver 1995 presents other examples that are meant to indicate that quantificational sentences don't carry universal presuppositions, but (as Irene Heim pointed out in a class discussion) they are flawed: they contain the verb *discover*, which is not a strong presupposition trigger, and replacement of *discover* by *regret* restores the presupposition.

²¹ The minimally different example in (i), notice, does seem to exhibit a universal presupposition:

(i) One of the fat men was riding his bicycle.

I also think that we find a universal presupposition in (ii):

(ii) At least one fat man was riding his bicycle.

such a way as to yield universal presuppositions, the issue of how it is that universal presuppositions come about is not as yet completely settled issue. At the same time, I stress that the fact that there exist cases where universal presuppositions don't arise in no way means that my account is untenable. What would kill (or at least anaesthetize) my account is an independent reason for thinking that quantificational variability sentences pattern with the cases where universal presuppositions *don't* show up. I don't know of any such reason. In particular, I see no obvious surface similarity between quantificational variability sentences and sentences where universal presuppositions don't show up. (I have the impression, for instance, that it would be hard to assimilate quantificational variability sentences to denial sentences; an indication of this is that denial sentences disprefer monotone increasing quantifiers, but of course quantificational variability sentences don't.)

3.1.1. Interlude: The mechanism behind presupposition projection

There are a number of points in this thesis where I rely on the idea that quantified sentences give rise to universal presuppositions. So it is only responsible to give an account of how presupposition projection works, in enough detail that we can see why universal presuppositions surface. In this section, I will outline an account of presupposition projection that is based very loosely on Heim 1983. The way I present it, the part of the theory that concerns quantified constructions is going to seem more like a technical exercise than a piece of insight. However, my intention is merely to convey a general picture of what the process is that underlies presupposition projection.

²² Beaver 1995 contains a lengthy and detailed survey.

Linguistic expressions are used and evaluated in *contexts*. Presuppositions are conditions on the use of a linguistic expression in a context: if an expression carries a presupposition, that means that, if the expression is to be used appropriately in a context, then that context must obey certain requirements. To take a simple example, to say that the sentence *Iceland cherishes its king* presupposes that Iceland has a king is to say that one is only allowed to use the sentence in a context that entails that Iceland has a king.

On this view, why do presuppositions *project*? Why does it sometimes happen that the presupposition of a complex constituent systematically depends in some way on the presupposition that a subconstituent seems to carry? For instance, given that a sentence like *Iceland cherishes its king* presupposes that Iceland has a king, how does it come about that a sentence like *Most Scandinavian countries cherish their king* presupposes that all Scandinavian countries have a king? On this view, presuppositions project because using the complex constituent in a context involves using the subconstituent in a related *intermediate* context. If the intermediate context has to obey certain requirements in order for the subconstituent to be used appropriately, that will entail that the main context has to obey certain related requirements. So the basic idea is that using an expression like *Most Scandinavian countries cherish their king* in a context involves using an expression roughly of the form *X cherishes its king* in an intermediate context, and that the relation between the main context and the intermediate context guarantees that the quantified sentence has the presupposition that it does.

I will now present a rough version of this view. It is loosely based on the view of contexts in Stalnaker 1979, and it borrows technology and a couple of insights from the theory that Heim 1983 developed based on this view. (At the same time, it ignores a number of important insights in Heim 1983, and as a consequence it is almost laughingly

baroque in places where it doesn't have to be. All the same, it will do for my purposes here.) A notable (but possibly redundant) feature of this rough version is that I will continue to draw a connection between presuppositions and the conditions under which an expression's semantic value is defined. In particular, I will assume that one can use an expression in a context only when the context entails that its semantic value is defined -- in a sense that I will try to clarify very shortly.

To start with, what *is* a context, and how does our use of sentences relate to what is in the context? First, let me present the classic view due to Stalnaker 1979, which I will depart from slightly here. The classic view is that the context in which a sentence is evaluated (the *common ground*) consists of a set of *worlds*. It is the set of worlds that all parties to the conversation agree to entertain as potential candidates for the actual world at the relevant point in the conversation. For convenience (since I will have occasion to refer to this set later on) let us call this set of worlds the *S-set*; the classic view is that the context in which a sentence is evaluated is the *S-set*.

(35) The *S-set* is the set of worlds that all parties to the conversation agree to entertain as potential candidates for the actual world at the point that a sentence is uttered.

On the classic view, intuitively speaking, when we extract information from a sentence, we throw out from the context all those worlds that are not consistent with the truth of the sentence, and thereby create a new context in which we can evaluate other sentences.

Sentences thus convey information by trimming down our slate of potential candidates for the actual world. When we evaluate a sentence -- when we check whether it is true -- we are checking whether all the worlds in the current context are consistent with the truth of the sentence. One convenient way of doing this is to try to see whether, by processing the

sentence, we manage to change the current context or not. If we don't, then all the worlds in the current context must be consistent with the sentence, so the sentence must be true.

Here is a first revision to this view; it is essentially just an attempt to hold on to the classic view while assuming (as I do) that sentences denote functions from situations to truth values.²³ I will assume that, in every world in the S-set, there is some unique situation that is the situation of utterance. Let's call the set of these situations the *U-set*; each situation in the U-set determines a distinct world. The first revision is that the context against which a sentence is evaluated is not the S-set but rather the U-set. On this revised view, what we do when we extract information from a sentence is we take the set of situations that make it true and intersect that set with the situations in the context; the set that we thereby obtain is the new context.

(36) *Context update:*

A proposition p updates a context C by virtue of Σp , the set of situations that make the proposition true, being intersected with C .

($\Sigma p = \{s: p(s) = 1\}$, the characteristic set of p .)

Because using a sentence to update a context has the effect of eliminating situations in the context, and each situation in the context determines a different world, sentences convey information in much the same way that they do on the classic view. And, on the revised view, to evaluate the truth of a sentence, we check whether the situations in the current context are in the set of situations that make the sentence true. The natural way of doing

²³ It may or may not be coherent; still, since I do take propositions to be functions from situations to truth values, I need to assume something like it.

this is to update the current context with the sentence, and to see whether we wind up with a new set of situations.

Now here is how presuppositions enter the picture. There is an independent condition on when we are allowed to evaluate a sentence in a context:

(37) *Condition on the use of sentences:*

It is appropriate to use a proposition-denoting expression with meaning p in a context C only if, for every situation s in C , $p(s)$ is defined.

In other words, although presuppositions are not to be *equated* with definedness conditions on semantic values, the conditions under which the semantic value of an expression is defined *give rise* to a presupposition. One is only permitted to use a sentence in a context if, for every situation in the context, the denotation of the sentence applied to that situation yields a truth value. (And this is true even if one secretly knows that some of the situations in the context have no chance at being the actual utterance situation.) For instance, say that the denotation of a sentence like *The King of France is a fink* is defined in a situation only if there is a King of France in some situation that surrounds it. Then (37) says that we are not permitted to use the sentence if there are candidate utterance situations that are not part of situations containing a King of France. The sentence is simply inappropriate in this context. (37) also implies that we will not be able to evaluate the sentence if the way we evaluate sentences is by updating the current context with them.

Now we come to the revisions that allow us to treat quantified sentences. Recall that we are trying to pursue the idea that using or evaluating a quantified sentence in a

context involves building an intermediate context and using or evaluating a subconstituent of the sentence in that intermediate context. What we will say is that the intermediate contexts that we create are contexts *relativized to individuals*; that means that the objects that they consist of are not merely situations, but rather *pairs of situations and individuals*. When we use or evaluate a quantified sentence, we first create one such relativized context out of the set of situations that we are entertaining as candidates for the situation of utterance. We then update this relativized context with material that we cull from the quantifier's first argument -- a function from situations to predicates of individuals. We do this by intersecting the relativized context with the set of situation-individual pairs that, loosely speaking, make this function true. (I.e. the set of situation-individual pairs such that when you apply the function to the situation, and then apply the result to the individual, you get 1.) This gives us our intermediate context. Now, in that intermediate context, we offer up to our interlocutor, or evaluate, an expression that we obtain from the quantifier's second argument -- another function from situations to predicates of individuals.

(38) For any set of situations C , let C_r , the set C "relativized to individuals," be $\{ \langle s, a \rangle : s \in C \text{ and } a \text{ is an individual in the world of } s \}^{24}$

(39) *Intermediate context update:*

A function P from situations to predicates of individuals updates a set I of situation-individual pairs by virtue of J_P being intersected with I , where

$J_P = \{ \langle s, a \rangle : P(s)(a) = 1 \}.$

²⁴ This formulation could conceivably create problems when we concern ourselves with cases involving quantification over situations. Possibly the candidates for the situation of utterance contain an infinite number of subsituations. I haven't thought about this at all and won't worry about it here.

(40) To use/evaluate in a context C a quantified sentence of the form

$$\lambda s \ Q_{\alpha}[\dots s \dots] \ \beta[\dots s \dots]$$

is to update C_i with $\lambda s_{\alpha}[\dots s \dots]$, creating C_i' , and to use/evaluate $\lambda s \ \beta[\dots s \dots]$ in C_i' .

(I omit tense information and other complications of logical form here and throughout this part of the discussion.)

(41) *Example.*

To use/evaluate in a context C a sentence of the form

$$\lambda s \ \text{most} \ [[\text{countries}][F_x \ s]] \ [\lambda x \ [t_x \ \text{cherish their}_x \ \text{king} \ s]]$$

is to update C_i with $\lambda s \ [[\text{countries}][\xi_x \ s]]$, creating C_i' ,

and to use/evaluate $\lambda s \ [\lambda x \ [t_x \ \text{cherish their}_x \ \text{king} \ s]]$ in C_i' .

Now let's see how this gives rise to universal presuppositions. First of all, note that now, since we are using/evaluating non-propositional expressions, we have to understand what the conditions are on the use of these functions. The conditions are of course exactly analogous to the conditions on the use of propositions:

(42) *Condition on the use of constituents of quantified sentences:*

It is appropriate to use an expression (of the type of functions from situations to predicates) with meaning P in a context I of situation-individual pairs only if, for every $\langle s, a \rangle$ in I , $P(s)(a)$ is defined.

Now consider as an example the sentence *Most countries cherish their king*, assuming it has the logical form in (41). In using or evaluating this sentence, we must use the

expression $\lambda s [\lambda x [t_x \textit{cherish their}_x \textit{king } s]]$ in an intermediate context. Say that the denotation of this expression, applied to a situation and an individual, is only defined if the individual has a king in the situation. Then (42) tells us that we are not permitted to use this expression in an intermediate context if the context contains a single pair of a situation and an individual such that the individual does not have a king in the situation. But how do we get that intermediate context? First we take all the situations in the current context and put them together with individuals that they contain, forming a set of pairs of situations and individuals. Then we update that set with $\lambda s [[\textit{countries}][\xi_x s]]$, creating the set of all pairs of situations and relevant countries in the relativized context that we started out with (*relevant* countries because ξ_x delimits the domain of quantification). So what happens if just one situation in the current context contains a (relevant) country that has no king? We will not be able to update this intermediate context. And so the sentence will be inappropriate in this context. That's how this system gives rise to universal presuppositions.

Let me end with a note. This is not the simplest view of why presuppositions project universally in quantified constructions. A simpler view -- one that is not concerned with context update -- would be the following. When we evaluate a quantificational sentence, we evaluate as many propositions as there are individuals in the domain of quantification. I don't know of any arguments for this view, however. In a later section of this thesis, for convenience I will speak as though I am adopting the simpler view, but bear in mind that I do so merely for convenience.

3.2. Are we able to use the presuppositions of a sentence in searching for antecedents?

Another crucial part of my analysis of quantificational variability is that, once we compute the presupposition that every situation in the domain of quantification has a certain property, we can use this information to pinpoint what the domain of quantification is. In the case of the example I considered: once we compute the presupposition that every P_s -situation contains a single blue-eyed bear, we can then use this information to identify the value of P_s . At first sight, this seems both intuitive and justified. It seems no different from the claim that we can use the sortal information provided by the gender features of a pronoun to identify the pronoun's referent. If someone points vaguely in the direction of a couple and says

(43) He has no taste.

we can make a pretty good guess about who the speaker had in mind.

At the same time, however, Beaver 1994, 1995 and von Stechow 1994, 1996 have pointed out that we *cannot* always use sentence-internal information to determine the domain of a quantifier. Indeed, they point out that we cannot always take advantage of just the kind of presupposition that I have claimed we *do* take advantage of in identifying P_s . Here is an example that shows this. Beaver reports that, on a five point scale from “weird” upwards, his informants uniformly judged the following discourse weird:

(44) - How many team members and cheerleaders will drive to the match?
- Few of the 15 team members and none of the 5 cheerleaders can drive, but every team member will come to the match in her car. So expect about 4 cars.

(Beaver 1995, p. 115, ex. E139)

The intuition is that the clause *every team member will come to the match in her car* conveys that all 15 team members have a car, and this conflicts with what we naturally conclude from prior information in the discourse -- that few of the 15 team members have a car. But this is unexpected if we can use presuppositional information to determine the domain of quantification of *every*. Why? Let's say that *every team member will drive to the match in her car* has the (simplified) logical form in (45):

(45) every $[[F_x][\text{team member}]]$ $[\lambda y[y \text{ come to the match in her}_y \text{ car}]]$

As in the cases of adverbial quantification that we have considered, there is a "resource domain variable" F_x that narrows down the individuals that *every* quantifies over. The domain of quantification in (45) consists of those team members of whom F_x holds. Now, assuming that a sentence like *Mary will come to the match in her car* presuppose that Mary has a car, (45) should presuppose that every individual in the domain of quantification has a car -- or in other words that every team member of whom F_x holds owns a car. If we could use this information in determining the identity of F_x , there should be no problem with the dialogue in (44). It should be no less coherent than the following dialogue:²⁵

(46) - How many team members and cheerleaders will drive to the match?
 - Few of the 15 team members and none of the 5 cheerleaders can drive, but
every team member who owns a car will come to the match in her car. So

²⁵ Assuming that a natural value for F_x would be the characteristic function of the set of car-owning team members.

expect about 4 cars.

(Beaver 1995, p. 115, ex. E142)

But the dialogue in (44) is incoherent. So it looks as though, in identifying F_x , we cannot use the information that every team member of whom F_x holds owns a car.

At the very least, this poses a puzzle. If my proposal that indefinites carry a uniqueness presupposition is correct, one might expect sentences like *A blue-eyed bear is usually intelligent* and *Every team member will come to the match in her car* to behave in a parallel fashion. The former has the logical form in (47a); the latter has the logical form in (47b). The former carries the presupposition that every situation of which P_s holds contains a blue-eyed bear; the latter carries the presupposition that every team member of which F_x holds owns a car. Why should it be the case that we are able to settle on a value for P_s that is consistent with this presupposition, but that we are unable to settle on a comparable value for F_x ?

(47) a. usually P_s [$\lambda s, [a s, b-e-b]$ intelligent]

b. every [[F_x][team member]] [$\lambda y[y$ come to the match in her_y car]]

In fact, there is a real difference between sentences like the one in Beaver's example and sentences involving quantificational variability. Beaver's sentence is uttered in a context that already establishes a possible domain of quantification, while the quantificational variability sentence is not. In Beaver's example, the sentence *Every team member will come to the match in her car* does not appear in isolation: it is preceded by the sentence *Few of the 15 team members...can drive*. This sentence itself serves to

make salient a certain set of individuals, and in doing so it makes available a possible antecedent for F_x -- namely, the characteristic function of this set. Judging by the fact that, in the parallel example (48), *every* seems to quantify over individuals who are team members or cheerleaders, the set that the first sentence makes salient is the set made up of the 15 team members and the 5 cheerleaders.

(48) Few of the 15 team members and none of the 5 cheerleaders can drive, but everyone will get there somehow.

By contrast, in the case of the sentence *A blue-eyed bear is usually intelligent*, judged in isolation, we are given no clue from outside the sentence about possible antecedents for P_s . So suppose it is the case that, *when* the context makes available a possible antecedent for an anaphor, we prefer to use that antecedent, but, when there is no possible antecedent, we use sentence-internal clues and default strategies to construct one. Then that is enough to explain why the two sentences behave differently. Beaver and von Fintel, in fact, come to similar conclusions: Beaver writes in a footnote that “we could postulate that quantificational statements are always anaphoric on some set which is assumed to be salient, but that when this set has not been introduced explicitly, the hearer must globally accommodate a referent for the set” (Beaver 1995, p. 118, fn. 12). Von Fintel cites a contrast that is similar to the one that we have considered. Out of context, the sentence (49a) seems to express that every man who has a wife loves his wife; however, the incoherence of (49b) indicates that, in context, a sentence like *everyone loves their spouse* only asserts that everyone who has a spouse loves her/him if all the salient individuals are married.

(49) a. Every man loves his wife. (= von Fintel 1996, p. 4, ex. 8)

b. Not every player on the team is married. # But everyone loves his spouse.

(= von Fintel 1996, p., 4. ex. 9a)

At the same time, I think there is something more to be said. If we really always *had* to choose values for anaphors that the context made available, examples like the following (which I take to be fine) would also be predicted to be incoherent.

(50) A sequence of seven numbers is usually difficult to remember, but a sequence of four numbers is usually pretty easy.

In order to evaluate the first clause, we have to choose a value for P_s such that every P_s -situation contains a single sequence of seven numbers. Imagine what would happen if we had to let the quantifier in the *second* clause range over these situations as well. Then every situation that the quantifier ranges over in the second clause will be a situation that contains a sequence of seven numbers. At the same time, the presupposition of the second clause is that every situation that the quantifier ranges over contains a single sequence of four numbers. Since in every sequence of seven numbers there are four sequences of four numbers, this presupposition will be violated. It seems, then, that we have to say that there is a way in which quantificational variability sentences are special. Every time we use such a sentence, we can exercise the option of ignoring the context and looking for a new value of P_s .

Why do quantificational variability sentences appear to have this special property? Perhaps it should be related to the fact that quantificational variability sentences express generalizations, and statements that express generalizations are readily seen as independent of any state of affairs that the context describes. It is true that, in some other

quantificational sentences that express generalizations²⁶, we are allowed to escape the search for contextual antecedents for anaphors. I think, for instance, that (51) is coherent, despite the fact that the quantifier in the first clause is naturally taken to quantify over both cuckolded and noncuckolded husbands:

(51) Most men love their wife, though naturally few men care for their wife's lovers.

At the same time, the facts here are complicated. I think that the following sequence of sentences is odd -- and, assuming that we discover from the first sentence that the salient set of individuals is made up of individuals who have married one and only one woman, the oddness would follow from the quantifier in the second sentence being forced to range over individuals in this set.

(52) Most men devote themselves entirely to the woman they marry. # Of course, most bigamists are understandably somewhat divided in their attentions.

So I have to leave this hanging. Still, I hope to have made the point that it is indeed plausible that, in quantificational variability sentences, we use the presuppositions of the sentence to determine what the domain of quantification is.²⁷

²⁶ And related remarks are made in the literature. Beaver 1995, in that footnote, writes that "the claimed intermediate accommodation readings have only been found in sentences that have a distinctly generic flavour."

²⁷ On the surface, facts like the following look disturbing. The incoherence of the second sentence in (i) seems to show that we are not determining the domain of quantification of *usually* purely on the basis of sentence-internal material:

(i) A twenty-year-old is usually still unmarried. # At the same time, a twenty-year-old usually loves his spouse.

(These examples are parallel to examples involving determiner quantifiers -- another thing that might make people suspect that sentences with adverbial quantifiers really do involve quantification over individuals.)

(ii) Most twenty-year-olds are still unmarried. # At the same time, most twenty-year-olds love their spouse.)

However, note that we could analyze these examples as involving *two* resource domain variables:

(iii) Usually *P*, [λs [a s [[*F*₂][:twenty-year-old]]] ...]

3.3. Is (22) the product of a default strategy?

Another important component of my analysis was the claim that, once we have figured out that each of the situations quantified over contains a single blue-eyed bear, we take the further step of assuming that each situation contains a different blue-eyed bear. I claimed that this step does not follow directly from the semantics of the construction -- all the sentence itself gives us is the uniqueness presupposition. Rather, this step is a leap of imagination. It follows from a default strategy that we happen to apply in cases like this, where we have insufficient information to identify the value of an anaphoric element. This claim is important to the argument that indefinites carry a uniqueness presupposition in this respect: it allows us to say that, in order for quantificational variability to arise, the sentence itself has to do nothing more than impose a (universally projected) uniqueness presupposition. Still, is it justified?

It is justified. First, there is evidence that we use the same strategy in other kinds of sentences than the ones we have considered. Second, there is evidence that, even in sentences of the kind we have considered, the assumption that there is a one-to-one mapping from situations to individuals picked out by the indefinite is indeed a default assumption. When we know something more about these situations than merely that each situation contains a single individual of a certain kind, we don't adopt the assumption.

3.3.1. Evidence that we use the same strategy elsewhere

So we can at least describe what is going on here by saying that we prefer to find an antecedent for F_x in the preceding context, but not for P_x .

To argue that we use the same strategy in other kinds of sentences, we have to have some idea of what the strategy is. I will assume it is as simple as (53):

(53) In the absence of information to the contrary, assume all functions are one-to-one.

In other words, once we know there is a relation that pairs each element of one set with a unique element of another set, we take the step of assuming that the relation pairs each element of the first set with a *different* element of the second set -- unless we have good reason to believe otherwise. In the case we have been considering: once we know that there is a relation between situations and blue-eyed bears that pairs each situation with a unique blue-eyed bear, we take the step of assuming that the relation pairs each situation with a different blue-eyed bear -- unless we have good reason to believe otherwise. Now, there are certainly other cases where we use a strategy like this. Consider the following two sentences:

- (54) a. Most students keep their apartment clean.
b. Most student apartments are clean.

When you ask people if (54b) follows from (54a), they tend to say it does. But strictly speaking this is a mistake. At least according to my limited experience of the world, students often live with other students. If the majority of students live with other students, it could well be that (54a) is true but (54b) is false. Consider for example a microcosm that consists of six student apartments and twelve students. Two apartments are each inhabited by four students, and the inhabitants make sure to keep the apartment clean. Each of the other four apartments is inhabited by only one student, and for good reason: since they are so messy, no one wants to live with them. Well, now eight out of twelve students live in one of the clean apartments -- so (54a) is true -- but only two out of six apartments are

clean -- so (54b) is false. So why is there a tendency to say that (54b) follows from (54a)? Because, in evaluating these sentences out of context, we don't consider the possibility that students may live in the same apartment. In other words, when evaluating (54a), we use the default strategy in just the same way that we do when evaluating the sentence *A blue-eyed bear is usually intelligent*. Just as was the case with *A blue-eyed bear was intelligent*, (54a) carries a universal presupposition -- that every student in the domain of quantification occupies a single apartment.²⁸ But once we know that there is a relation that pairs each student with a single apartment, we then assume that this mapping is one-to-one. We jump to the conclusion that every student occupies a *different* apartment. And, if every student occupies a different apartment, (54b) does follow from (54a).

3.3.2. Evidence that (12) is a default

In examples of the kind we have been occupied with so far -- examples involving an adverbial quantifier and an indefinite -- it was reasonable to imagine that the one-to-one mapping from situations to individuals arises from a default assumption that we make in evaluating the sentence. This is because our only information about the situations in the domain of quantification comes from the uniqueness condition associated with the indefinite determiner, and, in examples of the kind we considered, that is plausibly not enough to identify a suitable domain. But moreover there is *evidence* that the one-to-one mapping comes from a default assumption that we resort to out of ignorance. It so happens that, when we *do* have more information about the domain of quantification, our interpretation for the sentence no longer requires this one-to-one mapping. So it must be

²⁸ I have tried to make the example parallel to the example of quantificational variability, and this is the reason for including the presupposition trigger *their apartment* in (54a). In fact, we probably do not need presupposition projection to arrive at the conclusion that each student in the domain of quantification occupies a single apartment: we can probably come to this conclusion purely on the basis of other aspects of our world knowledge.

that, when (judging by our interpretation for the sentence) there apparently *is* a one-to-one mapping from situations to individuals, that is because of an assumption that can be overridden in the presence of more information.

There are two ways in which we can obtain information about the domain of an adverbial quantifier: we can extract information from the sentence itself, and we can extract information from the context. For instance, material in (55) itself is enough to suggest to us that *never* quantifies over situations that include (or directly follow) moments when the archer shoots an arrow with the intention of hitting a target. The presupposition that *miss* triggers tells us that every situation in the domain is a situation that includes (or possibly directly follows) moments when the archer aims at a target with the intention of hitting it -- that's because it is only appropriate to say that someone missed a target in a certain situation if to begin with that person was aiming at the target with the intention of hitting it, and the presupposition projects. The term *archer* helps us narrow down the domain of quantification, though more as a matter of guesswork: we know that archers shoot arrows, and, there being no other information in the sentence that tells us what the archer's target is and what he is aiming at it, we suppose that, whatever the target is, the archer is probably aiming an arrow at it.

(55) That archer never misses.

In (56), the context plays a role in determining the domain of quantification.

- (56) A. That archer has the disturbing habit of spitting out the window at passers-by.
B. Yes, and, what is worse, he never misses.

A's remark makes salient a set of situations during which (or possibly directly following which) the archer spits out the window at passers-by. This set of situations constitutes the domain of *never*. In the terms of the discussion so far: A sentence like (55)/(56) has a logical form like that in (57).

(57) usually P_s [$\lambda s,$ that archer misses $s,$]

(57) is true iff most situations of which P_s holds are situations of the archer missing. In the case of (55), we rely on sentence-internal information to identify P_s . In the case of (56), the discourse makes available an antecedent for P_s -- the characteristic function of the set of situations during which the archer spits out the window at passers-by. In interpreting the sentence, we assign P_s this value.

I will give two examples of sentences that are in their overall shape like the sentences we considered earlier --- they contain an adverbial quantifier and an indefinite -- but that are different in that more information is available about the domain of quantification. In the first case, the sentence itself gives us more clues about the domain of quantification. In the second case, the sentence is used in a context that clearly establishes

the domain of quantification.²⁹ Both sentences, I think, have interpretations that are inconsistent with there being a one-to-one mapping from situations to individuals described by the indefinite's nominal predicate. To the extent that these examples are convincing, they argue that the one-to-one mapping from situations to individuals in quantificational variability sentences does not follow from the semantics of the construction, but rather from an additional assumption that we use to establish a domain of quantification when none is independently established -- or, in the terms of the discussion in the previous section, from an assumption that we use in attempting to resolve the anaphor P_s .

A word at the outset about the nature of the argument. Each sentence that I will consider attributes a property to a certain proportion of the situations in some domain. I present a scenario, and ask whether each sentence is appropriate and true in the scenario. Crucially, I imagine that, when we judge whether the sentence is appropriate and true in a scenario, we are looking at situations *that the scenario describes* and asking whether that proportion of them that the sentence specifies has the property that the sentence specifies. In other words, for the purpose of the argument, I crucially assume that the quantifier does not have a modal component -- that it does not quantify over situations that are different from the situations that the scenario describes but that are somehow accessible given the facts of the scenario. With this in mind, I show that we cannot account for our judgment if we imagine that each situation that the quantifier ranges over contains a different individual of the kind described by the indefinite's nominal predicate. So there is a warning: if in fact, when evaluating these sentences, we take the quantifier to range over situations other than those described by the scenario, the argument cannot be made so straightforwardly.

²⁹ I indicated in the last section that, when the context determines a salient set of situations, one doesn't have to use it in determining the value of P_s . All the same, it is possible to use it (at least to the extent that examples like () are acceptable). Still, this happens more rarely than one might imagine.

(Another thing to note: In the example where the sentence itself gives additional clues about the domain of quantification -- the first example that I consider -- I am not really able to establish here that *the presence of these clues* is enough to get us to relax the default assumption. To do that, I would have to take a clear case where the scenario does *not* make a set of situations salient, and to show that in cases like this, we *still* imagine that sentence doesn't effectively involve quantification over individuals. In my discussion below, I ask the reader to consider whether the sentence is true on a particular scenario where I have carefully outlined a set of situations, and so a set of situations *is* salient.)

As far as the first example, the sort of scenario that I am concerned with is this. Imagine that I come back home after a vacation and find evidence that during my absence the house has been overrun by squirrels. In particular, I can see tracks all over the floor. Some trails of pawprints lead from the back door (in which some animal appears to have chewed an enormous hole). Some trails lead from the kitchen closet (in which I discover another hole). Some trails start from the table in the living room (apparently, the window above the table was pried open). I should mention that the pawprints are quite bold, and it is pretty easy to tell one squirrel's pawprints from another. Some squirrels leave larger pawprints, some leave smaller ones. One seems to have let his tail drag on the floor after him. Moreover, it is quite clear that the squirrels have become pretty familiar with the house, and that a substantial number have gone through it more than once.

Now, bearing this in mind, the example I want to consider is:

(58) a. A squirrel that came in by the back usually left by the back as well.

(Or alternatively:

- b. Most of the time, a squirrel that came in by the back left by the back as well.
- c. In most cases, a squirrel that came in by the back left by the back as well.)

I take the (simplified) logical form of (58) to be:³⁰

(59) usually P_s [λs , [[a s , [squirrel]] (OP) λx , [t_{x3} come-in s ,]]] leave s ,]

In brief, (59) is true iff, for most situations s such that P_s holds of s , the unique individual in s that is a squirrel and that comes in by the back in s leaves by the back in s .³¹ (59) is an example where, thanks to the relative clause, we have more information about possible values for P_s than simply that each P_s -situation must contain a single squirrel. (59) tells us not merely that each P_s -situation must contain a single squirrel but rather that, in every P_s -situation, there is a single squirrel *coming in by the back*. This is because the uniqueness presupposition itself is more complicated -- [[[[a s , [squirrel]] (OP) λx , [t_{x3} come-in s ,]]]] is defined only if there is a unique individual in [[s]] that is a squirrel and that comes in at [[s]].³²

³⁰ Some salient characteristics are: the λs abstractor that appears at the top of usually's second argument binds the s -position introduced by the indefinite, the s -position introduced by the verb *come (in by the back)* and the s -position introduced by the verb *leave (by the back)*; a λx abstractor is inserted above the position from which the (vacuously interpreted) relativizer has moved, and binds it.

³¹ This actually is *not* the way the logical form in (59) is interpreted. According to what I said in the introduction about how the situation arguments of predicates are interpreted, (59) is true iff, for most situations s such that P_s holds of s , the unique individual in s that is a squirrel and that comes in *AT* s , and assuming that one cannot both come in and leave at the same time, there actually are no such situations. The problem only arises, however, because of simplifications I have made in the logical form; if I had included the existential operator above VPs, the existential quantifier would bind the s -position of *leave*, and we wouldn't run into this problem. So I hope I can be forgiven for translating the logical form in (59) inaccurately, and we can behave as though the truth conditions of (59) are as I say they are.

³² Sentences like (35) are obviously reminiscent of sentences containing *when*-clauses, which I touch on very little in this thesis but which have played an important role in the development of theories of

Now, I think that I could say that I discovered (58) merely on the basis of the fact that most trails of pawprints that started at the back door ended at the back door as well. It doesn't matter so much whether it is true of most of *the squirrels that came in* that they (ever) left by the back. For example, although this is a lot of trails to follow, I might be able to perceive the following by looking at the trails of pawprints that lead from the back door: four squirrels in all came in through the back door, that two of those squirrels came in very few times (say twice each) and never left by the back, but that two of the squirrels came in many more times (say they each came in six times) and left by the back each time. I think that, even if I knew the facts were like this, I could say that I discovered (58) without thinking that I was uttering a bare-faced lie. What counts is just that it happened more often than not that the squirrel that came in by the back left by the back as well.

But suppose that, in each P_s -situation, there had to be a different squirrel coming in by the back. There would then be no way that (59) could be true given the scenario that I have presented, where six squirrels in all come in by the back. To evaluate the sentence at all given this scenario, we would have to choose four situations, in each of which a different squirrel comes in by the back. We would then say that (59) is true only if, in most of these situations, the squirrel that came in left by the back. Even if we could choose situations appropriately, we could *never* judge (59) to be true, because half (two)

indefinites. For an early attempt to relate quantificational variability sentences like *A person who has blue eyes usually also has blond hair* and *When a person has blue eyes, he usually also has blond hair*, see Carlson 1982. (The latter sentence is said to exhibit an instance of "atemporal when.")

A puzzle that arises for the analysis in this thesis is why sentences like (35) are somewhat odd when the relative contains a predicate that describes a transitory, "episodic" property and the main predicate describes a stable property. (i b) for instance compares unfavorably with (i a). (Some sentences of the kind in (i b) are slightly better than others: the sentence *When you see a student in the corridor, he is usually in his first or second year* does not seem quite so bad.)

- i. a. A squirrel that came in by the back usually left by the back as well.
- b. ? A squirrel that came in by the back usually had large paws.

We find the same phenomenon with *when*-clauses:

- ii. a. When a squirrel came in by the back, it usually left by the back as well.
- b. ? When a squirrel came in by the back, it usually had large paws.

I have no explanation for this. As far as I am aware, the only theory that does is de Swart 1995 -- though de Swart herself doesn't mention it. (Higginbotham and Ramchand 1996 are aware of the fact involving *when*-clauses, and attribute to Kratzer 1995 an explanation for it that Kratzer does not in fact adopt. It seems from their paper that they might have an account for it, but in the draft I read it wasn't spelled out

of those situations would be situations that contain squirrels who never leave by the back. So, assuming we do judge (59) to be true in the scenario in question, this shows that there is no one-to-one mapping from the situations that *usually* quantifies over to squirrels that come in by the back in those situations.

The second example is (60a).

(60) a. Danny usually knew whether a blue-eyed bear was intelligent.

(It would be equally appropriate for our purposes to consider:

b. Most of the time, he knew whether a blue-eyed bear was intelligent.

c. In most cases, he knew whether a blue-eyed bear was intelligent.)

(60a) does not on its own contain any information about the situations in the domain of *usually* other than that they each contain a single blue-eyed bear (and, I will assume, Danny). The idea, however, is to consider (60a) uttered in a particular context. When we evaluate the truth of (60a) against a particular contextual backdrop, our judgment is inconsistent with there being a one-to-one mapping from situations in the domain of quantification to blue-eyed bears. This suggests that the context is establishing the domain of quantification, and that, in such conditions, there need not be a one-to-one mapping between situations in the domain of quantification and blue-eyed bears.

For now, I will assume that (60) has the vastly simplified logical form in (61). I will treat the example in much greater detail later, in Chapter 4.

clearly enough for me to understand.) The solution to this puzzle presumably will have some bearing on

(61) usually P_s [λs , Danny know-whether s , [λs , [$a s$, b-e-b] intelligent]]

I will assume that the truth conditions of (61) can be roughly characterized as follows: (61) is true iff, for most situations s such that P_s holds of s , either the unique blue-eyed bear in s is intelligent and Danny is aware of this at s , or the unique blue-eyed bear in s is *not* intelligent and Danny is aware of *this* at s . I will also assume that, as in our other examples, (61) presupposes that every P_s -situation contains a unique blue-eyed bear, as well as Danny. (This depends on the assumption that the presupposition associated with the indefinite determiner projects in such a way that the complex expression *Danny know-whether s , [λs , [$a s$, b-e-b] intelligent]* presupposes that $[[s,]]$ contains a unique blue-eyed bear; this latter presupposition would then project in the standard way. While this is quite intuitive, it is not obvious from the logical form in (61). It also depends on the assumption that *Danny knows-whether s , ...* presupposes that Danny is in $[[s,]]$, another thing that is not immediately obvious.)

Now imagine this scenario. Danny has agreed to be a subject in an experiment, and he has the following task to perform. He watches as bears walk out from behind a screen and then walk behind it again, one at a time, and his task is to say whether the bear that just walked out is intelligent or not. As it happens, he is confronted most of the time with the one or two blue-eyed bears whose intelligence he is unsure of, even though, for most of the bears that he is confronted with, he is in fact aware whether they are intelligent. To be precise, let's say that there are 10 bears total. For 8 of those bears, it is absolutely clear to him (for whatever reason) whether they are intelligent or not, but for 2 of those

bears he hasn't the faintest idea. Still, those two walk out from behind the screen a total of 40 out of 48 times, and all the others one time each. Could I report the results of the task with the sentence in (60a)? I think not. More importantly, I think there is an intuition that in (60a) is *false* as a report of this scenario -- and, in fact, it differs in this respect from the admittedly awkward (62), which we would judge as true:

(62) Most blue-eyed bears were such that Danny knew whether they were intelligent.

But suppose that each P_s -situation had to contain a different blue-eyed bear. There would then be no way that (60a) could be false on such a scenario. To evaluate the sentence at all in the scenario, we would have to choose ten situations, each of which contains a different blue-eyed bear (and Danny). Assuming we could choose ten such situations,³³ we would always judge (60a) to be true. This is because eight out of ten situations would be situations that contain bears of transparent IQ. So, assuming we do judge (37a) to be false in the scenario in question, this shows that there is no one-to-one mapping from the situations that *usually* quantifies over to bears in those situations.³⁴

Indeed, I believe the intuition is that the situations that we take *usually* to quantify over are situations where Danny has to make a judgment. So it appears that what is happening is that, when we judge whether (60a) is true on this scenario, the set-up itself makes salient a

³³ And assuming that each such situation occurs at or after the point when Danny sees the blue-eyed bear for the first time.

³⁴ Note that it is crucial that we judge (60a) to be *false* rather than *inappropriate*. If we judged (60a) to be *inappropriate*, that could be due to a conflict between the value that the context encourages us to assign to P_s , and the requirement that each P_s -situation contain a different blue-eyed bear.

The fact that the argument here relies on distinguishing between our intuitions of *falsity* and our intuitions of *inappropriateness* means that it is somewhat tenuous. It would be better to take an example where we judge a sentence as true when maintaining a one-to-one mapping from situations to blue-eyed bears would predict falsity or inappropriateness. An appropriate example might be (i), under the very scenario that I have presented.

(i) Danny rarely knew whether a blue-eyed bear was intelligent.

Respondents differ as to whether they find (i) true or inappropriate; I myself find the use of *rarely* a little odd in sentences like this, and therefore find it difficult to judge the sentence. Of course, to the extent that there *are* speakers who judge (i) true, this is enough to make my point.

set of situations -- those in which Danny has to make a judgment -- and that the value that we assign to P_i is the characteristic function of this set.

Chapter 3.

Indefinites and individual-level predicates:

An argument for an s-position

1. Introduction

In my analysis of how quantificational variability arises, I proposed that those indefinites that give rise to quantificational variability contain a determiner that selects for a situation argument. The idea that these indefinites make available a position that an adverbial quantifier can bind was important in explaining how quantificational variability arises: in sentences that exhibit quantificational variability, the adverbial quantifier binds this very position. (More precisely, the lambda abstractor that furnishes the second argument of the adverbial quantifier binds this position.) In this chapter, I present a further argument that indefinites that give rise to quantificational variability make available a position that an adverbial quantifier can bind. The argument is essentially due to Kratzer 1995³⁵. However, since my assumptions differ from hers, the details of the account differ from hers as well.

In Section 2, I present the argument briefly. In Section 3, I present Kratzer's account, and attempt to motivate a different kind of approach, which I then detail in Section 4.

2. Argument

³⁵ The paper was first circulated in 1988 and generated a large body of research long before it was published.

The argument, briefly, is this.

First consider sentences like the ones in (1) and (2). If we imagine that intelligence and knowledge of a language are stable properties -- that an individual tends to retain them from one moment to the next as long as nothing drastic happens to him -- then (1) and (2) are distinctly odd.

- (1) a. # Bob is usually intelligent.
b. # Most of the time, Bob is intelligent.
c. # In most cases, Bob is intelligent.

- (2) a. # Fabrizio usually knows his local dialect very well.
b. # Most of the time, Fabrizio knows his local dialect very well.
c. # In most cases, Fabrizio knows his local dialect very well.

Unlike the sentences in (1) and (2), the parallel sentences in (3) and (4) are good -- still on the understanding that intelligence and knowledge of a language are stable properties. The sentences in (3) and (4) differ from (1) and (2) in that we have substituted for a term that does not contain a dependency on the quantifier another term that does contain a dependency on the quantifier. The phrase *the bear at the back* potentially picks out a different bear for every situation that *usually* ranges over; the phrase *the local dialect* potentially picks out a different dialect for every situation that *usually* ranges over.³⁶ (To facilitate the processing of these sentences, imagine that the quantifier in (3) ranges over occasions when we visit that spot in the zoo where bears are kept, and that the quantifier in

³⁶ See Mitchell 1986, Partee 1989 for a discussion of the kind of dependency encoded by *local*.

(4) ranges over occasions when we travel to an Italian village with our friend Fabrizio.
These scenarios, of course, do not facilitate the processing of the sentences in (1) and (2).)

- (3) a. *The bear at the very back* is usually intelligent.
b. Most of the time, *the bear at the very back* is intelligent.
c. In most cases, *the bear at the very back* is intelligent.
- (4) a. Fabrizio usually knows *the local dialect* very well.
b. Most of the time, Fabrizio knows *the local dialect* very well.
c. In most cases, Fabrizio knows *the local dialect* very well.

Because the sentences in (1)-(2) only differ from the parallel sentences in (3)-(4) in that they are missing one term that contains a dependency on the quantifier, we can conclude that the problem with (1) and (2) is basically a problem with variable binding. Whatever the problem is with (1) and (2), it has to do with there being too few positions around for the quantifier to bind. The problem with (1)-(2) disappears when, as in (3)-(4), we make available a position for the quantifier to bind.

Now consider the sentences in (5) and (6), which are also parallel to (1) and (2). The sentences in (5) and (6) permit quantificational variability: they seem to be able to express what the sentences in (5') and (6') express. Like the sentences in (3) and (4), the sentences in (5) and (6) are fine -- still on the understanding that intelligence and knowledge of a language are stable properties. We can therefore conclude that, in (5) and (6), the indefinite makes available a position for the quantifier to bind. That is the argument.

- (5) a. *A blue-eyed bear* is usually intelligent.
 b. Most of the time, *a blue-eyed bear* is intelligent.
 c. In most cases, *a blue-eyed bear* is intelligent.³⁷
- (5') Most blue-eyed bears are intelligent.
- (6) a. *An Italian* usually knows his local dialect very well.
 b. Most of the time, *an Italian* knows his local dialect very well.
 c. In most cases, *an Italian* knows his local dialect very well.
- (6') Most Italians know their local dialect very well.

This should be enough to support the claim that the indefinites that give rise to quantificational variability find the available position that an adverbial quantifier can bind. But what exactly is the problem with (1) and (2), and why can't the quantifier find a position to bind there? That is what the rest of the section is about.

3. Kratzer's Proposal, and why it isn't mine

In this subsection, I will summarize Kratzer's account of how the variable binding problem in (1) and (2) arises. I will then attempt to motivate a departure from Kratzer's account. I will spend the ensuing subsections articulating an alternative that I take to be more desirable.

³⁷ (5c) is somewhat degraded for me, though apparently not for other speakers.

3.1. Kratzer 1995

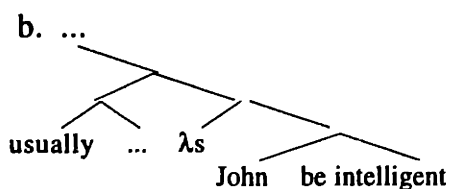
Kratzer (1995) quite straightforwardly assumed that there simply is no position in (1) and (2) of the kind that adverbial quantifiers bind.

She argued that this follows from a fundamental aspect of predicates like *be intelligent* and *know Swedish* (on their standard uses) that describe tendentially stable, long-term properties. Adopting terminology from Carlson 1977, she distinguished between two kinds of predicates, *individual-level predicates* like *be intelligent* and *stage-level predicates* like *be in his office* and *sneeze*, which describe more transitory properties. She argued that stage-level predicates select for an argument of the kind that adverbial quantifiers bind, but individual-level predicates do not. (She assumed that this argument is a “spatiotemporal location,” i.e. “a space-time chunk like the space occupied by this room today.” (p. 128) She also assumed following Carlson that individuals have spatiotemporal parts. So a predicate like *sneeze* applies to an individual and a spatiotemporal location, and says that the part of the individual that occupies the spatiotemporal location is engaged in sneezing. By contrast, a predicate like *be intelligent* only applies to an individual, and says that the individual in his entirety is disposed to intelligent behavior.)

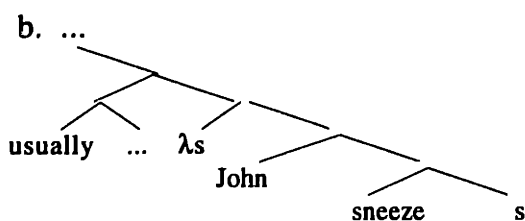
Positing a selectional difference between individual-level and stage-level predicates allowed Kratzer to explain why a sentence like (7a) differs in status from a sentence like (8a). (7a) involves an individual-level predicate, *be intelligent*; (8a) involves a stage-level

predicate, *sneeze*. (7a) has a logical form like the one abbreviated in (7b), while (8a) has a logical form like the one abbreviated in (8b).³⁸

(7) a. # Bob is usually intelligent. (= (1a))



(8) a. Bob usually sneezes.



Look at (7b). The quantifier *usually* needs a predicate (of “spatiotemporal locations,” for example) as its second argument. So there needs to be something at the level of logical form that can create such a predicate: a λs . But there is no variable below the λs that the λs can abstract over! So, if there is a general constraint against vacuous abstraction, the logical form in (7b) will violate this constraint. By contrast, in (8b), there *is* a variable that the λs can abstract over: it’s the extra spatiotemporal argument that the stage-level predicate *sneeze* selects for.³⁹

³⁸ (7a) and (7b) are not the exact logical forms that Kratzer assumes. For convenience, I have made them consistent with other assumptions that I have been adopting, such as the assumption that quantifiers select for predicates rather than formulas. I am also overlooking the contribution of tense here, but will return to it later.

³⁹ Because Kratzer assumes that quantifiers select for open propositions, she assumes logical forms for (7a) and (8a) like (i) and (ii) -- respectively -- and assumes that (i) violates a constraint against vacuous quantification (iii).

(i) usually [...] [John be intelligent]
(ii) usually, [...] [John sneeze s]

As we have seen, sentences such as (9) and (10) differ in status from sentences like (7a). They pattern with sentences involving stage-level predicates, although their main predicates are individual-level. Why is this? At this point I have to depart from Kratzer's precise proposal, because her analysis of cases like these involves both semantic assumptions (about the translations of indefinites and definites) and syntactic operations (involving how a predicate comes to restrict an adverbial quantifier) that would delay the present discussion and that I intend to touch on later in the thesis. However, the basic idea is that, even though the individual-level predicate *be intelligent* itself cannot provide a variable for the λ s to abstract over, the subject expressions *the bear at the back* and *a Colombian pickpocket* can.⁴⁰ For our purposes here we might for instance assume a logical form for (9) like the one in (9'). While *intelligent* is not stage-level, the phrase *at the back* is, and accordingly the λ s in (9') abstracts over the spatiotemporal argument that *at the back* selects for.

(9) The bear at the back is usually intelligent.

(iii) *Prohibition against Vacuous Quantification* (p. 131): For every quantifier Q, there must be a variable x such that Q binds every occurrence of x in both its restrictive clause and nuclear scope.

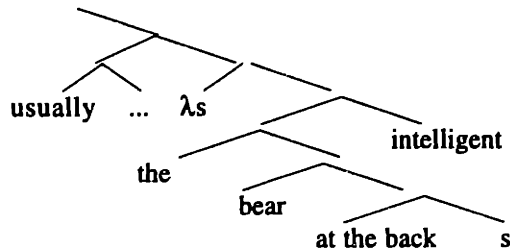
⁴⁰ Kratzer assumes following Heim 1982 that adverbial quantifiers are "unselective binders" and can quantify over -tuples of entities. (See Chapter 4 for discussion of theories of this sort.) Chunks of space-time can be among these entities and so can individuals (Kratzer's discussion of tense seems to indicate that individuals and spatiotemporal locations are the same kind of entity, so one should probably not treat this as an independent stipulation). She further assumes that indefinites and definites are both propositions made up of a predicate and an individual variable, and that in sentences like (9) and (10) they raise to form the quantifier's restriction, leaving below a trace of the type of individuals. So the logical forms of (9) and (10) would be roughly as in (i) and (ii) respectively:

- (i) usually_{x,s} [[bear x][x at the back s]] [t_x be intelligent]
- (ii) usually_x [[Colombian pickpocket] x] [t_x be intelligent]

Note with regard to these logical forms that a variable appears in the restrictor only because it is provided by the indefinite or definite subject (and that a variable appears in the scope of the quantifier only because the subject expression has raised from there). So for Kratzer the acceptability of these examples is crucially related to the fact that the subject expression introduces a variable.

(10) A Colombian pickpocket is usually intelligent.

(9')



Kratzer's idea that predicates like *intelligent* are handicapped with respect to their selectional properties provides a clean and simple way of accounting for the facts in (1)-(6), but I cannot adopt it as it stands.

3.2. Objections

Two things motivate me to revise Kratzer's proposal . One is the fact that the proposal conflicts with specific assumptions that I am making. Another is the desire to link the contrasts involving adverbial quantifiers to contrasts involving temporal modifiers.

The first reason is that Kratzer's proposal is inconsistent with what I take tense to be. I take tense to quantify over the same kind of entity that adverbial quantifiers range over. Specifically, I assume that tense involves existential quantification over *situations*. Past tense, for instance, applies to a situation (consider it the situation of utterance) and a predicate of situations; it says that some other situation *s'* that is located temporally prior to the utterance situation satisfies the predicate. Present tense carries the same selectional requirements and says that some situation *s'* that includes the situation of utterance satisfies the predicate ((11)).

(11) relevant lexical entries for tense:

- a. $[[\text{PAST}]](s_1)(P) = 1$ iff there is some s such that s is located temporally prior to s_1 and such that $P(s) = 1$.
- b. $[[\text{PRES}]](s_1)(P) = 1$ iff there is some s such that s includes s_1 and such that $P(s) = 1$.

Now, if both tense and adverbial quantifiers quantify over situations, then it cannot be that predicates like *be intelligent* and *know French* fail to *select* for an argument of the kind that adverbial quantifiers range over. If they did, they would not only fail to license adverbial quantifiers in examples like (C1), they would also fail to license *tense* in examples like (12) and (13)!

(I assume of course that expressions like *John* do not select for situation arguments.)

(12) a. John was intelligent.

b. mini-If I assume for (12a):

$\lambda s_1 [[\text{PAST } s_1] [\lambda s_2 \text{ John be intelligent } s_2]]$

(13) a. Fabrizio knows French.

b. mini-If I assume for (13a):

$\lambda s_1 [[\text{PRES } s_1] [\lambda s_2 \text{ Fabrizio know French } s_2]]$

So if I wish to maintain my assumptions about tense, I have to give up the notion that predicates like *be intelligent* and *know French* are selectionally handicapped in the way that Kratzer intends. This is not a real *criticism* of Kratzer's proposal, of course; she has

her own analysis of tense, which is not the one I am assuming but which plays an important role in her paper.

The second reason is a little more removed from theory-internal considerations. It is a feeling that, when we have problems using adverbial quantifiers together with predicates that denote stable properties, we should trace these problems back to conditions on temporal modification. Parallel to the contrasts between (1)/(2) and (3)/(4) involving adverbial quantification, we find very similar contrasts involving temporal modification. The sentences in (14), for instance, seem to be much more restricted in their use than the sentences in (15) -- once again, continuing to imagine that intelligence and knowledge of a language are stable properties.⁴¹

- (14) a. # Bob is intelligent today.
b. # Fabrizio knew his local dialect very well on that occasion/ Wednesday.
- (15) a. The bear at the back is intelligent today.
b. Fabrizio knew the local dialect very well on that occasion/ Wednesday.

Moreover, adverbial quantifiers often feel identical in their function to temporal modifiers. In particular, they seem able to range over objects that appear as complements to the prepositions that one finds in temporal modifiers. Given an adverbial quantifier, we can generally find a temporal modifier containing a determiner quantifier that makes the same semantic contribution -- (16a), for instance, seems roughly identical in meaning to (16b) or

⁴¹ This is not to say that they are completely out. However, when confronted with the sentences in (14), one is much harder pressed to think of scenarios that support them than one is for the sentences in (15). What are scenarios that support them? (14a), for example, is the sort of thing that one might say if one knew that a significant change had occurred in Bob's physical makeup between yesterday and today that affected his capacity for intelligent behavior ("Bob was practically a vegetable yesterday, but the operation was successful and he is intelligent today.") There will be lengthy discussion of this in the next section.

(16c.) So it is natural to think that at least some adverbial quantifiers are interpreted in the same way that temporal modifiers (containing determiner quantifiers) are.⁴²

- (16) John used to pay us a visit every June.
- a. He usually brought us presents.
 - b. On most of those occasions, he brought us presents.
 - c. He brought us presents on most of those occasions.

It seems natural to look for a unified explanation for the contrasts involving adverbial quantification and the contrasts involving temporal modification. The clearest way of unifying the two kinds of contrasts on Kratzer's proposal would be to say that not only adverbial quantification but also temporal modification is licensed as long as there is a variable that a λs can abstract over. (One could analyze temporal modifiers themselves as quantificational phrases. Or one could stipulate independently, as Kratzer seems to, that a temporal modifier is licensed only if it contains a spatiotemporal variable coindexed with

⁴² Do adverbial quantifiers and temporal modifiers *always* express the same kinds of things? Should we *always* treat adverbial quantifiers as essentially the same as temporal modifiers that contain determiner quantifiers (as far as the meanings they express)? Not obviously. For one thing, notice that temporal modifiers that contain a determiner quantifier are frequently unable to bind the situation argument of an indefinite, though they *can* bind the situation position in a term like *the bear at the back*:

- (i) a.? On half of those occasions, a bear was intelligent.
b. On half of those occasions, the bear at the back was intelligent.

So to some extent, adverbial quantifiers are more liberal in the situations that they can quantify over. (In the literature, it is said that they allow "atemporal" readings.) It is also worth noting that it is not the case that adverbial quantifiers occupy all and only the positions that the corresponding temporal modifiers occupy. Unlike temporal modifiers, for example, which systematically may appear after the VP (without inducing an intonational break), adverbs like *always*, *usually*, *never* and *more often than not* refuse to appear in this position (whichever it is). I've indicated this in (iii).

- (ii) a. *Half the time*, he brought us presents.
a'. *On half of those occasions*, he brought us presents.
b. He brought us presents *half the time*.
b'. He brought us presents *on half of those occasions*.
- (iii) a. # He brought us presents usually.
b. # He brought us presents more often than not.

the spatiotemporal variable in the VP.⁴³) However, once we say this, we can no longer say that predicates that describe stable properties systematically lack an argument of the kind that a λs can abstract over. This is because we do not want to *systematically* rule out temporal modification of a predicate that describes a stable property. It is not possible to modify a predicate denoting a stable property with just *any* temporal modifier ((17a), (18a)), but nonetheless it is possible to temporally modify predicates that describe stable properties. The modifier just has to be one that, at a first approximation, picks out a sufficiently lengthy period of time, or perhaps more accurately one that picks out a significant period of the life of the holder of the property.⁴⁴

- (17) a. # Bob was intelligent on that occasion.
 b. Bob was intelligent before the accident.
- (18) a. # Fred was nearsighted on his fifth birthday.

⁴³ Kratzer assumes that temporal modifiers are saturated expressions that include a spatiotemporal argument, e.g. [*this week* s] (the idea, I guess, is that [[*this week* s]] = 1 iff the temporal duration of s is included in this week). She assumes (I gather) that temporal modifiers are sisters of VPs and interpreted as conjoined with them. She talks (p. 128) about “temporal and spatial expressions... relat[ing] to the *verb* they modify via the Davidsonian [spatiotemporal] argument” [italics mine]. I take it that she means that modifiers are licensed only if their spatiotemporal argument is a variable coindexed with a spatiotemporal argument within the VP; if she really means that it has to be coindexed with the *verb*’s spatiotemporal argument, she would incorrectly rule out the examples in (15).

⁴⁴ It might look like cheating to use these examples against Kratzer, because she would not consider the predicates in (17) and (18) individual-level predicates. It seems that for her a predicate is only individual-level if it describes a property that lasts until the end of one’s days. (She says (p. 155) that *be French* counts as stage-level when we use the sentence *Henry was French* to convey that Henry lost his French citizenship and became an American citizen. When we do so, we still construe being French as a stable property, one that persists from one moment to the next unless something drastic happens.) In that case, the predicates in (17) and (18) should select for spatiotemporal arguments. But it appears to me that assuming something like that is quite against the spirit of the rest of the analysis. Given that it is very likely for nearsightedness not to persist from youth to old age, it will now go unexplained why sentences like (18b) or (i) are bad. With respect to licensing of temporal modification that picks out small periods as well as with respect to licensing of adverbial quantification, verbs like *nearsighted* and *intelligent* behave in all respects just the way lifetime properties do even if we know that the property is not lifelong, just so long as we think of the property as stable. In the end, I see no reason to treat them differently.

(I) # Fred was usually nearsighted.

b. Fred was nearsighted in his youth.

It seems then that, if we want to connect the contrasts involving adverbial quantification to the contrasts involving temporal modification, we need to make *some* change in Kratzer's proposal. In particular, given that there is clear evidence that they do license certain instances of temporal modification, we might not want to insure that *in principle* predicates that describe stable properties fail to license adverbial quantification, because there is clear evidence that they do license certain instances of temporal modification. (Of course, since it is not as hard to find temporal modifiers that go with stable properties ((17/18b)) as it is to find adverbial quantifiers that do (cf. (7a)), one component of our explanation will have to say why.)

3.3. Foreshadowing

My goal in the coming subsections will be to expand on Kratzer's idea that the problem with sentences like (1)/(2) is a problem with variable binding, but at the same time to adopt an essentially different approach. In the end, my proposal will fall far short of the mark, but I think its basic outline is correct, and hope that others can improve on it.

To begin with, I will assume that all predicates select for a situation argument -- an argument of the kind that adverbial quantifiers can in principle bind. More importantly, however, I will try to stick to two ideas. First, I will maintain that the source of the contrasts involving adverbial quantification is ultimately the same as the source of the contrasts involving temporal modification. Second, I will adhere to the idea that there is no formal difference between predicates like *intelligent* and predicates like *sneeze* -- only the semantic difference that *intelligent* describes something that we take to be a stable property and *sneeze* does not. I will essentially be proposing that the contrasts have a pragmatic

origin, and to the extent that this minimizes the number of lexical idiosyncracies we have to attribute to predicates, I think this is the most desirable approach to take.

4. Steps to an alternative account

The basic idea of the account that I will propose is that the unease that we experience when we evaluate sentences like (19) out of context is connected to an assumption that we automatically make when we evaluate these sentences. The assumption is essentially that, if John is disposed to intelligent behavior at any particular moment, then he is also disposed to intelligent behavior at moments around it.

(19) format: *X has (tendentially stable) property P at time T.*

a. # John is intelligent now/today/this year.

b. # John was intelligent then/yesterday/on June 25, 1969.

The oddness of sentences like (20) has the same source. In (20), a quantifier binds the position occupied by the temporal adverbial in (19). Roughly speaking, when we evaluate a quantificational sentence like (20b), we are evaluating many different sentences of the form *John was intelligent at t*, one for each item in the domain of the quantifier, and seeing how many of these sentences are true. These component sentences are of the form in (19). If just one of these component sentences strikes us as odd, then (20b) will also strike us as odd.

(20) format: *δ -often, X has (tendentially stable) property P.*

- a. # John is usually intelligent.
- b. # Half of the time John was intelligent.

My approach in this section will be first to explain what goes wrong in examples like (19), and then to indicate how the same thing goes wrong in examples like (20). In Subsection 1, I will motivate the basic idea that the oddness of (19) is linked to particular assumptions that we make about the context when we have insufficient information, I will address the question of *why* we make these assumptions, and I will try to pinpoint what exactly it is about these assumptions that blocks the use of (19). In Subsection 2, I will show how the account generalizes to constructions involving adverbial quantifiers.

As I mentioned above, my precise account will be disappointingly unsuccessful -- I suspect because I am conflating two different ways in which temporal modification can be licensed. However, I want to stress the basic idea: that the constraints on the use of temporal modifiers with predicates denoting stable properties are pragmatic in origin, and that these constraints “project” in sentences containing adverbial quantifiers.

4.1. Temporal modification

4.1.1. Sentences like those in (19) are acceptable under certain contextual conditions.

I point out in this section that temporal modification of predicates like *intelligent* is not impossible. In particular, sentences like (19) no longer seem so odd if we set up the context in the right way. I then make a rough attempt to characterize the conditions under which we can and cannot use temporal modifiers. As far as I am aware, the kind of data

that I discuss in this section is new -- and this is unfortunate, because it is in my description of it that I think my fault lies.

As (21) shows, one can felicitously utter a sentence like *John was intelligent yesterday* when one is willing to entertain the possibility that John is no longer disposed to intelligent behavior today. I believe that in (21) there is no intuition that *intelligent* has been coerced into a use other than its normal one. ((22), which mirrors (21), is another perfectly acceptable example of a case where *John is intelligent* can be temporally modified.)

(21) a. # John was intelligent yesterday.

b. John had a quite serious accident early this morning. Although he was intelligent yesterday, I am afraid that today he is to all intents and purposes a vegetable.

c. -I finally spoke to John this morning. What an idiot. He has no creativity, no spark of originality, not even any common sense. Nothing.

- That's pretty bizarre. He was intelligent yesterday.

(22) John was intelligent before the accident.

From this, I conclude (23):

(23) One can felicitously utter a sentence of the form *X has (tendentially stable) property P at time T* when one is willing to entertain the possibility that, at some time shortly after T, X no longer has property P.

As (24) and (25) show, one can felicitously utter a sentence of the form *John is bald at t* when one is willing to entertain the possibility that John was not bald before today, and one can felicitously utter a sentence like *This week, John knows French* when one is willing to entertain the possibility that John did not know French before this week.⁴⁵

(24) a. # John is bald today.

b. -Did you meet John yet? I met him yesterday for the first time, and I was very

⁴⁵ Judgments are mixed when one puts sentences like (25a) in the past tense. The following text seems all right to me, but there are those who disagree with me:

(i) John's language learning abilities are amazing. Every week, he knows a new language. *He knew French last week. This week, he knows Italian.*

In general, it seems that when a temporal modifier locates a situation of, e.g. John's knowing a language or John's intelligence, in the future or the past, there is often a strong implicature that such a situation does not hold in the present. The temporal modifier itself seems to be responsible for this effect; examples with past or future tense and without temporal modification do not exhibit this implicature as strongly (for a lengthy discussion of cases where the implicature does not arise, see Musan 1995.)

We can explain the appearance of this implicature if we assume that, in the relevant sentences, the temporal modifiers are analyzed as contrastive topics, the only alternative to John's knowing a language (for instance) is John's *not* knowing that language, and the modifier is always taken to contrast with *now*. But I don't know why any of these should be the case.

(One might be able to make some headway on these issues by adopting other analyses of individual-level predicates. Suppose, for instance, that (roughly following Chierchia 1995b) the s-position of *know* is always bound by an implicit operator, and that for some reason it is impossible to put this operator above a temporal modifier (although temporal modifiers can in principle modify constituents of the kind that the operator attaches to). Suppose, however, that this operator can have a restriction that contains an s-position -- so one can introduce a temporal modifier only if it is at least as high as the operator. Suppose as well that for independent reasons all temporal modifiers generated this high have to be interpreted as contrastive topics. Then we would predict that in all sentences containing individual-level predicates and temporal modifiers, the modifier would have to be interpreted as a contrastive topic.)

In any event, I don't know if we want a theory that predict that implicatures of this kind *always* arise when there is a temporal modifier that locates a property in the past or future. Here are other examples involving a past modifier and a property of situations (Michela's knowledge of English, or John's being dead) that tends to hold of a later situation if it holds of an earlier one. For me, again, there is no implicature that Michela does not know English now, and no implicature that John is not dead now.

(iii) When I met Michela in Rome five years ago, she promised me that she would learn English. And indeed, when I picked her up at the airport on Wednesday, she knew English.

[She presumably does now as well.]

(iv) The characters in this play are dropping like flies. John was dead at the end of the first act. Mary and Jane were dead at the end of the second act. I wonder whether anyone will be left at the end of the third act.

[Presumably, John, Mary and Jane are dead now as well.]

impressed by his shock of red hair.

- Something terrible must have happened! I met John this morning for the first time, and he is bald today!

c. -Are you sure that was John? I mean, I was introduced to John this morning, and I don't know whether anything drastic happened to him since yesterday, but I can tell you that he is bald today.

(25) a. # This week, John knows French.

b. John's language learning abilities are amazing. Every week, he knows a new language. This week, he knows French. I bet that next week he'll know Italian.

From this, I conclude (26):

(26) One can felicitously utter a sentence of the form *X has (tendentially stable) property P at time T* when one is willing to entertain the possibility that, at some time shortly before T, X did not have property P.

Note that, in those cases where temporal modification is possible, there is no intuition that the predicates *be intelligent*, or *know French*, or *be bald*, have been coerced into a special and atypical use. I believe that in (21), there is no intuition that *intelligent* has been coerced into a use other than its normal one -- and likewise for *bald* in (24) and *know French* in (25). Moreover, if we were to say that temporal modification is only possible when the matrix predicate is coerced into a special use, we would be faced with the question of why coercion is apparently so much easier in (27b) than in (27a).

- (27) a. # Louis was bald that day.
b. Louis was bald in his later years.

Why *is* (27b) less odd than (27a)? Intuitively, these cases are analogous to the ones we have already considered, although I haven't yet spelled out anything that they might follow from. Just as we can say that John is intelligent during some period if it seems natural to us that, once we step outside that period, John might not be intelligent, we can say that Louis is bald during some period if it seems natural to us that, once we step outside that period, Louis might not be bald. We are more willing to accept that whether Louis is bald or not can change from one major period of Louis' life to the next than from one day to the next.

4.1.2. *A rough characterization of the contextual conditions on temporal modification*

In the discussion to come, I will assume the following approximate characterization of the conditions under which temporal modification is infelicitous.

- (28) Informally:
- a. It is infelicitous to use an expression of the form *P at/on T*, where *P* stands for a predicate of situations and *T* for a period of time, in a context from which it follows that **if *P* holds at/on *T*, then *P* holds at a time surrounding *T*.**
- b. Example:

It is infelicitous to use *John be intelligent yesterday* in a context from which it follows that if John is intelligent yesterday, then he is intelligent at a time surrounding yesterday.

This informal statement attributes the oddness of a sentence like (27a) to assumptions that we make about the context when we are given no information in advance. The idea is that we naturally construct a context according to which, if John was bald yesterday, then he also was bald during a period surrounding yesterday. By contrast, in (27b), so the story goes, we do not as naturally construct a context according to which, if John was bald in his later years, he was also bald at a period surrounding his later years.

I am well aware that even this informal statement has its problems. We can begin to see them by considering once again the following pair of examples (= (21a,b)):

(29) a. # John was intelligent yesterday.

b. John had a quite serious accident early this morning. Although he was intelligent yesterday, I am afraid that today he is to all intents and purposes a vegetable.

(28) actually seems to predict a contrast between (29a) and (29b), but closer examination shows that this is due to a lucky chance. (28) predicts that (29a) is odd, on the assumption that in the absence of information we construct a context according to which, if John was disposed to intelligent behavior yesterday, then he also was disposed to intelligent behavior during a period surrounding yesterday. Given the fact that (29b) sets up a context in which an accident occurs in the early morning that could affect John's disposition to intelligent behavior, (28) predicts that (29b) should be fine *as long as it is possible that the*

*accident*⁴⁶ immediately followed yesterday. *In the early morning* is vague enough for this, but unfortunately, the contrast holds up even when we are more specific about the time. (30), like (29), is fine, and (28) seems to predict infelicity:

(30) John had a quite serious accident at 2:00 this morning. Although he was intelligent yesterday, I am afraid that today he is to all intents and purposes a vegetable.

A similar problem arises in (31) (modeled on (25b)). Even if we know that John learns his languages on the weekend, and consequently that there is a time before this Tuesday when he knew French, (31) is felicitous.

(31) John has the amazing ability to learn languages in a single weekend.
I see John every week, and every week he knows a new language.
This Tuesday, he knew French.

In other words, if we want to maintain (28), it seems that we are forced to say that we simply ignore certain time intervals when we determine whether a sentence with temporal modification is felicitous.⁴⁷

This difficulty is very unpleasant, but I will ignore it and press on. My main concern is just to demonstrate that it is plausible that pragmatic conditions on temporal

⁴⁶ Or at any rate the change in John's disposition to intelligent behavior.

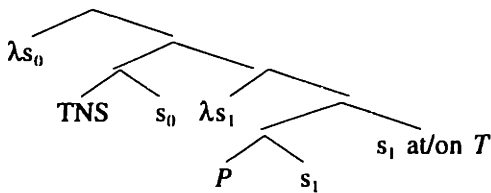
⁴⁷ An alternative would be to assume a weaker condition for infelicity (/stronger condition for felicity). This was Kai's suggestion. The condition would be that it is felicitous to use an expression of the form *P at/on T* as long as there is a time before or after T at which P does not hold. (For instance, it is felicitous to use *John be intelligent yesterday* as long as there is a time before or after yesterday at which John is not intelligent.) This kind of condition would not be sufficient to distinguish examples like (i) (which is similar to (27a)) from examples like (ii) (which is similar to (27b)). Of course, this is not a real problem if there is some other condition around that would distinguish the two.

(i) I met Eisenhower at that party. # He was bald on that day, and looked quite distinguished.
(ii) Eisenhower was bald in his later years.

modification are enough to account for the necessity of an extra *s*-position in sentences that contain an adverbial quantifier and a predicate like *intelligent*. My hope is that, even if the particulars of the pragmatic proposal that I adopt here are not correct, the general story will hold once the correct pragmatic conditions are recognized. Moreover, although I will make no attempt here to derive the stipulation in (28), I expect that, whatever the correct conditions on temporal modification are, they are deducible from deeper principles of pragmatics; see Musan 1995 for an attempt to explain similar phenomena on the basis of Gricean principles.

Here is a rough, more formal spelling out of (28), for use in the future discussion. Bearing in mind the simplified logical forms that I will use later on, I will assume for now that the condition on infelicity applies to a piece of logical form that includes tense⁴⁸. However, I am making this assumption for expository convenience, and there are other directions that I could take. Note in advance that I take it that an expression like [[John is intelligent *s*]] can be true or false even when *s* is momentary -- and that it is true if John is disposed to intelligent behavior at that moment.⁴⁹ (Note too with regard to the formulation of (29) that, to make the exposition simpler, I will temporarily assume that the situation argument of a predicate is its last argument rather than its first.)

(32) a. *It is infelicitous to use an expression of the form*



⁴⁸ I am omitting the additional existential quantifier over situations that would normally go below *s*₁.

⁴⁹ And more generally I assume that *intelligent* has the subinterval property.

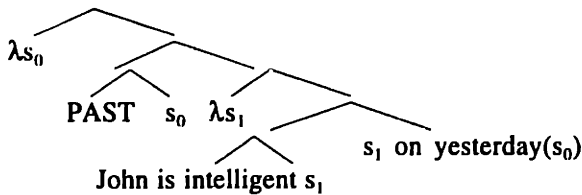
in a context from which it follows that

if $\exists s \text{ [[P]]}(s) = 1 \ \& \ \text{[[at/on]]}(\text{[[T]]})(s) = 1$

then $\exists t \ t \text{ surrounds}^{50} \text{ [[T]]} \ \& \ \exists s' \ [\text{[[P]]}(s') = 1 \ \& \ s' \text{ lasts the duration of } t.]$

b. Example:

It is infelicitous to use an expression of the form



in a context from which it follows that

if $\exists s \ \text{[[John is intelligent]]}(s) = 1 \ \& \ \text{[[on]]}(\text{[[yesterday(s0)]]})(s) = 1$

then $\exists t \ t \text{ surrounds} \ \text{[[yesterday(s0)]]} \ \&$

$\exists s' \ \text{[[John is intelligent]]}(s') = 1 \ \& \ s' \text{ lasts the duration of } t.$

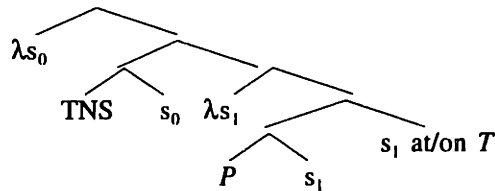
One more embellishment for the moment. Recall that I assume that the context (C) in which a sentence is evaluated consists of a set of situations s_0 , each of which we take to be a candidate for the situation of utterance, and each of which occupies a different world.⁵¹ We say that *it follows from the context* that a certain proposition p holds of the utterance

⁵⁰ t^* surrounds t iff $t \subset t^*$ & $\exists t_1, t_2 \subset t^*$ t_1 precedes t & t_2 follows t .

⁵¹ In the ensuing discussion, sometimes I will be careless and talk about the context as the set of candidates for the actual world -- i.e. the set of worlds that house the situations in the context.

situation if, for all s_u in C , $p(s_u) = 1$. So I propose to rewrite (32) as follows:⁵² (I use w_u as an abbreviation for the world of s_u)

(33) a. *It is infelicitous to use an expression of the form*



in a context C

when

for all $s_u \in C$,

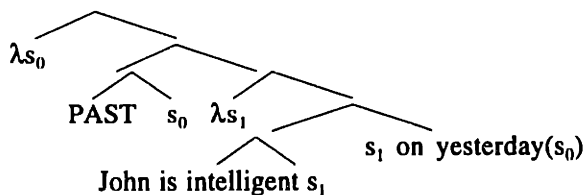
if $\exists s \in w_u$ $s R^{53} s_u$ & $[[P]](s) = 1$ & $[[at/on]]([[T]])(s) = 1$

then $\exists t$ t surrounds $[[T]]$ &

$\exists s' \in w_u$ [$[[P]](s') = 1$ & s' lasts the duration of t .]

b. Example:

It is infelicitous to use an expression of the form



⁵² (33) differs from (32) in that the (in)felicity condition includes tense information. The decision to include tense information *per se* is rather arbitrary; I do it here in order to introduce the utterance situation (and therefore a dependency on worlds) into the condition.

⁵³ R here is the relation encoded by tense -- *temporally precedes* if tense is PAST, *temporally contains* if tense is PRES, *temporally follows* if tense is FUT.

in a context C

when

for all $s_u \in C$,

if $\exists s \in w_u$ s temporally precedes s_u & $[[\text{John is intelligent}]](s) = 1$ &

$[[\text{on}]]([[yesterday(s_u)])](s) = 1$

then $\exists t$ t surrounds $[[yesterday(s_u)]]$ &

$\exists s' \in w_u$ $[[\text{John is intelligent}]](s') = 1$ & s' lasts the duration of t .

4.1.3. Stable properties, and the nature of the context

Thus far, I have suggested that what typically goes wrong when we evaluate a sentence of the kind in (34) is that there is a mismatch between the contextual requirements of the temporal modifier and the context in which we evaluate the sentence. In particular (though with some reservations), I have suggested that a sentence of the kind in (34) is infelicitous if it follows from the context that, if John is intelligent at t , then he is also intelligent around t .

(34) John is intelligent at t .

In this section, I will try to offer a reason for why it is that it so often follows from the context that, if John is intelligent at t , then he is also intelligent around t , and specifically for why it is that the default context that we construct has this property.

The idea, in a nutshell, is this. First, it follows from the meaning of *intelligent* that, *ideally*, if John is intelligent at t, then he is intelligent around t. Second, we assume that the actual world is as close to the ideal as is consistent with our information. Importantly, we will see that, although it follows from the meaning of *intelligent* that, ideally, if *John* is intelligent at t, then *John* is intelligent around t, it does *not* follow from the meaning of *intelligent* that, ideally, if *the bear at the back* is intelligent at t, then *the bear at the back* is intelligent around t.

Imagine what things would be like if nothing happened that we perceive as unexpected -- if there were no apparently random accidents, no car crashes, no earthquakes or volcanic eruptions, and if everyone died a natural death. Even if this would be physically impossible, I think that we can imagine such a state of affairs, and that we are at least under the illusion that this is a coherent picture. Call the set of ideal worlds of this kind **Wd**.⁵⁴ Let us define a *stable property of situations* as follows:

(35) *q* is a *stable property of situations* iff

$$\forall s_1, s_2 \in \text{Wd}$$

$$[q(s_1) = 1 \ \& \ s_2 \text{ follows } s_1 \text{ temporally}^{55} \ \& \ q(s_2) \text{ is defined}] \ \rightarrow$$

$$q(s_2) = 1 \ .$$

Something is a stable property of situations, in other words, if, ideally, one can conclude from the fact that it holds in one situation that it will also hold in a later one.

⁵⁴ If the generalizations that describe what it means for everything to happen "as expected" are *inconsistent*, then **Wd** is null, and this is a potential problem. I ignore this here, and assume that **Wd** contains at least one world. Note that I assume that possible worlds may violate the laws of physics, so if a world where everything happens "as expected" is physically impossible, that is not in itself a problem.

⁵⁵ I assume that one situation can only follow another temporally if it is in the same world.

I claim that it is part of the meaning of predicates like *intelligent* that, when they apply to individuals, they give rise to stable properties of situations. Indeed, I take it that this is what we have in mind when we say that intelligence is a tendentially stable property. When we say that a property of individuals P is tendentially stable, we mean the following:

$$(36) \quad \forall s_1, s_2 \in \text{Wd}, x,$$

$$[P(s_1)(x) = 1 \ \& \ s_2 \text{ follows } s_1 \text{ temporally} \ \& \ P(s_2)(x) \text{ is defined}] \rightarrow$$

$$P(s_2)(x) = 1 .$$

To say that intelligence is a stable property is to say that our knowledge of the meaning of *intelligent* includes the following:

$$(37) \quad \forall s_1, s_2 \in \text{Wd}, x,$$

$$[[[\text{intelligent}]](s_1)(x) = 1 \ \& \ s_2 \text{ follows } s_1 \text{ temporally} \ \& \\ [[\text{intelligent}]](s_2)(x) \text{ is defined}] \rightarrow$$

$$[[\text{intelligent}]](s_2)(x) = 1 .$$

If (37) is part of our knowledge of the meaning of *intelligent*, then we can conclude from (37) that *λs John be intelligent s* is a stable property of situations:

$$(38) \quad \text{By (37) and universal instantiation,}$$

$$\forall s_1, s_2 \in \text{Wd},$$

$$[[[\text{intelligent}]](s_1)([\text{John}]) = 1 \ \& \ s_2 \text{ follows } s_1 \text{ temporally} \ \& \\ [[\text{intelligent}]](s_2)([\text{John}]) \text{ is defined}] \rightarrow$$

$$[[\text{intelligent}]](s_2)([[\text{John}]])) = 1 .$$

Since $\forall s'$ $[[\text{intelligent}]](s')([[\text{John}]]) = [[\lambda s \text{ John be intelligent } s]](s')$,

it follows that

$$\forall s_1, s_2 \in \text{Wd},$$

[$[[\lambda s \text{ John be intelligent } s]](s_1) = 1$ & s_2 follows s_1 temporally &

$[[\lambda s \text{ John be intelligent } s]](s_2)$ is defined]

$$\rightarrow [[\lambda s \text{ John be intelligent } s]](s_2) = 1.$$

Which means by (35) that $[[\lambda s \text{ John be intelligent } s]]$ is a stable property of situations.

But, importantly, note that we can *not* conclude from (37) that λs *The bear at the back at s be intelligent s* is a stable property of situations. If it *were* a stable property of situations, then by (35), the following would have to be true:

$$(39) \quad \forall s_1, s_2 \in \text{Wd},$$

[$[[\lambda s \text{ the bear at the back } s \text{ be intelligent } s]](s_1) = 1$ &

s_2 follows s_1 temporally &

$[[\lambda s \text{ the bear at the back } s \text{ be intelligent } s]](s_2)$ is defined]

$$\rightarrow [[\lambda s \text{ The bear at the back } s \text{ be intelligent } s]](s_2) = 1.$$

Or in other words the following would have to be true:

(40) $\forall s_1, s_2 \in \text{Wd}$,

[[[intelligent]](s_1)([[the bear at the back s_1]]) = 1 & s_2 follows s_1 temporally
& [[intelligent]](s_2)([[the bear at the back s_2]]) is defined]
--> [[intelligent]](s_2)([[the bear at the back s_2]]) = 1.

But *this* could only be true (or at least could only follow from (37) if the following were true:

(41) $\forall s_1, s_2 \in \text{Wd}$

s_2 follows s_1 temporally -->

[[the bear at the back s_1]] = [[the bear at the back s_2]]

In other words, we could only conclude from (37) that λs *The bear at the back at s be intelligent s* is a stable property of situations if we assumed something *else* as well: we would also have to assume that the unique bear who is at the back in one situation would have to be identical to the unique bear who is at the back in any later situation. And we have no guarantee of that. In general, we can see that, if you have a constituent that denotes a stable property of situations, and you take a name inside that constituent and substitute for it a term that contains a situation variable, you might well wind up with an unstable property of situations. We will generally be able to conclude that the resulting constituent is also a stable property of situations only if we know that the term picks out the

same object in one situation that it picked out in an earlier situation. If we assume that it doesn't, then the resulting constituent will not be a stable property of situations.⁵⁶

Now, I claim that, when we have no information to the contrary, we imagine that the actual world is one of those ideal worlds where nothing happens unexpectedly. The set of worlds that we take to be candidates for the actual world is W_d . When we *do* have information to the contrary, we still imagine that the actual world is as close to the ideal worlds as is consistent with our information. The set of worlds that we take to be candidates for the actual world is composed of worlds that are as close as possible to worlds in W_d as is consistent with our information. In other words, I propose that, at any moment, the set of worlds that we take to be candidates for the actual world is a set of worlds with an epistemic modal base and an ordering source given by the worlds in W_d . (Cf. Kratzer 1991.) This set of worlds⁵⁷ serves as the context in which we evaluate a sentence. (I have formulated my claim quite ambitiously -- as a claim not merely about language use, but about psychology more broadly. However, I could have been more modest. I could have simply said that the context in which we evaluate a sentence is a set of worlds with an epistemic modal base and an ideal ordering, without at the same time identifying the context with the set of candidates for the actual world.)

(42) *Rule for constructing contexts:*

At the point when a sentence is uttered,

⁵⁶ With even more generality: Take a constituent $\lambda s_p[...Y...]$ that denotes a stable property of situations. Take a subconstituent Y of P whose denotation does not vary on different assignments to the variable s . Substitute for it a constituent Y' whose denotation *does* vary on different assignments to the variable s . The larger constituent $\lambda s_p[...Y'...]$ that you wind up with will be an unstable property of situations, as long as the denotation of P' depends on what the denotation of Y' is.

⁵⁷ Or more accurately the set of utterance situations in these worlds. I will continue to be careless this way.

let K be the set of propositions that describe our state of knowledge,

W_k be the set of worlds $\{w: \forall p \in K \ p(s_w) = 1\}$ consistent with these propositions.

a. The set of worlds that we take to be candidates for the actual world at that point

is $W_c = \{w: w \in W_k \ \& \ \forall w' \in W_k [w \text{ is at least as close to } W_d \text{ as } w']\}$.

b. The context in which we evaluate the sentence is (the set of situations of utterance in) W_c .

What does this do for us as far as sentences like (19)/(33) are concerned? The idea is this. Consider again a sentence like *John is intelligent at t*. Let us assume that both intelligence and lack of intelligence are tendentially stable properties. Then for every world in W_d , if John is intelligent in one situation, he remains intelligent, and if John is unintelligent in one situation, he remains unintelligent. This moreover means that, if John is intelligent in one situation and that situation is neither the initial situation of John's intelligence (i.e. a situation that includes his birth) nor the final situation of John's existence (i.e. a situation that includes his death), then John is intelligent at a situation around it. Now suppose we have no information that at any point John undergoes a change that could affect his intelligence. In the simplest case, we have no information at all. In that case, we take the context to be W_d . Now, for every situation in W_d , if John is intelligent at that situation, and if that situation is neither one that includes his birth nor one that includes his death, then there is a situation temporally surrounding it at which John is intelligent. So, as long as t is not a time interval that includes John's birth or John's death, temporal modification will be ruled out. A slightly less simple case is one where we have information that the context is not W_d . In that case, the context will not be W_d , but it will be the set of worlds closest to W_d that are consistent with our information. I take it that, if

we have no information that John at any point undergoes a change that could affect his intelligence, for every world in the context, it will again be the case that, if John is intelligent in one situation, he remains intelligent, and if John is unintelligent in one situation, he remains unintelligent. So, once again, by the same reasoning, as long as t is not a time interval that includes John's birth or John's death, temporal modification will be ruled out. How about if we have information that at some point John undergoes a change that could render him unintelligent? In that case, the worlds closest to W_d that are consistent with our information will be worlds in which any *change* in John's intelligence is permanent. For every world in the context, if John is intelligent in one situation, then he remains intelligent until any point of change that follows, and, if he is unintelligent in one situation, then he remains unintelligent. Temporal modification is ruled out if, for every world in the context, if John is intelligent at t , then John is intelligent at a time surrounding t . So here temporal modification will be ruled out unless (a) t is a time interval that includes John's birth; (b) t is a time interval that includes John's death; (c) t is a time interval that extends up to the point of change. The predictions here are possibly too weak in the cases of temporal modifiers that name time intervals that include birth or death⁵⁸, but at any rate thus far these are the predictions of the account.

⁵⁸ For instance, I think the following sentences are both somewhat odd:

- (i) John was intelligent on the day of his birth.
- (ii) John was intelligent at the hour of his death.

In general, the inadequacies of this account stem from the fact that the condition on infelicity is concerned with whether a property holds at *surrounding* time intervals. Consequently, if a tendentially stable property has a temporal endpoint (an onset or finish), the account predicts that we can use a temporal modifier that includes the endpoint.

(We could remedy this problem by adding the following to the condition on infelicity in (16):

- (iii) if $\exists s \ R \ s_w$ & $[[P]](s) = 1$ & $[[at/on]]([[T]])(s) = 1$
and if $\exists t$ t surrounds $[[T]]$ & $\exists s' \in w$ [$[[P]](s')$ IS DEFINED & s' lasts the duration of t .]

The idea is that $[[\lambda s \text{ John is intelligent } s]](S)$ is only defined if John is alive for the duration of S , and so, if T' is a time that surrounds a time that includes John's birth or John's death, and S' lasts the duration of T' , then $[[\lambda s \text{ John is intelligent } s]](S')$ will not be defined.)

I will note here also, without elaborating, that it is only on technicalities that the account admits sentences like *The bear at the back was intelligent yesterday* (and therefore the parallel quantified sentences as well).

4.2. Adverbial quantification⁵⁹

So far, we have seen that the use of temporal modifiers is quite restricted when the main predicate describes a stable property. I have made a suggestion as to why. On the one hand, temporal modifiers impose a requirement on the context that makes reference to the period during which the main predicate holds. On the other hand, the context frequently conflicts with the requirement of the temporal modifier, and this is linked to the fact that the main predicate describes a stable property. Once more: In a sentence of the form in (43), use of the temporal modifier requires that we don't take it for granted that, if John was disposed to intelligent behavior yesterday, then he was disposed to intelligent behavior for some period including yesterday. But generally, in the absence of information, we *do* take this for granted.

(43) John was intelligent yesterday.

Still, how do we get from here to the fact that parallel sentences involving adverbial quantification are resoundingly awful?

(44) ?? John was usually intelligent.

⁵⁹ This section was unfortunately curtailed due to time constraints, and I hope to expand it in a future version. I had also hoped to include an appendix of relevance to some examples in Chapters 2 and 4. The appendix was to discuss my assumptions about the structure and interpretation of *know-whether* and explains how it comes to be that knowledge-whether is a stable property in (i) but not a stable property in (ii).

(i) Danny usually knows whether John is in his office.

(ii) # Danny usually knows whether John is intelligent.

It was also to run through my much-used example (iii), and give some indication of why it is important for me to use an example involving *know-whether* in making my arguments. For now, suffice it to say that important to these examples is that the binder of the indefinite's s-position is an abstractor in the embedded clause rather than the abstractor that heralds the second argument of *usually*. In general, as (iv) indicates, *usually* doesn't bind across clauses.

(iii) Danny usually knows whether a blue-eyed bear is intelligent.

(iv) # Danny usually knows that a blue-eyed bear is intelligent.]

In short, we get there by saying that evaluating a sentence of the kind in (44) is just like evaluating many sentences of the kind in (43) -- one for each time that is quantified over. Somewhere along the way, just as in (43), a requirement on the context will conflict with something that we are taking for granted.

To be brief, what makes the sentences involving adverbial quantifiers so terrible is that adverbial quantifiers themselves impose a presupposition that there be at least three elements in their domain of quantification (perhaps even more than that in the case of *usually*). A sentence like (44) could only be felicitous if there are at least three periods such that we find it plausible that John's disposition to intelligent behavior changed before or after those periods. And if it is our tendency is not to consider scenarios on which there is one occasion on which a person's disposition to intelligent behavior might change, we might well refuse to consider scenarios in which there are at least three such occasions.⁶⁰

Significantly, in contexts where it is understood that an individual undergoes a large number of dramatic changes in his lifetime, and the adverbial is understood as quantifying over periods in the individual's life, sentences like (44) improve. A potential example is (45a), where it is understood that Munch went through a number of stylistic periods, each of which was markedly different from the previous one in some way.

(45) Munch was usually a somber artist, but during his Yellow Period he painted a few portraits of smiling children.

⁶⁰ I think that this point can be made even stronger, but I have not yet been able to think through the argument.

Chapter 4.

The Alternatives.

1. Two essentially different approaches to quantificational variability

On the approach to quantificational variability that I presented in Chapter 2, adverbial quantifiers quantify over situations and situations only. Sentences containing adverbial quantifiers are able to express quantification over individuals when the situations in the domain of the quantifier have a particular character. (For instance, in the case of *A blue-eyed bear is usually intelligent*, the situations in the domain of the quantifier each contain a different unique blue-eyed bear.) Moreover, in the simple cases of quantificational variability that I considered, *nothing about the structure of the sentence gives any clue as to what situations are in the domain of quantification*. Fixing the domain of quantification is exclusively the job of the pragmatics, and the presupposition that the indefinite carries is (once projected) the factor that guides us in our search for a suitable domain.⁶¹

I assume in general that, at the level of logical form -- the representation that serves as input to compositional rules of interpretation -- the sister of a quantifier is interpreted as the quantifier's restrictor and the sister of the resulting constituent is interpreted as the quantifier's scope.⁶² When I say that nothing about the structure of the sentence gives any

⁶¹ Von Stechow 1994 also takes the view that the domain of an adverbial quantifier is determined exclusively by the pragmatics in these cases, and I will address his proposal at the end of the chapter.

⁶² It could be otherwise. (Chierchia 1995a, for instance, assumes that the first argument of an adverbial quantifier is interpreted as its scope. Since he takes indefinites to restrict adverbial quantifiers, following Heim 1982, this means a lot less cutting and pasting on the way to logical form.) But this doesn't matter: what I am saying is that, whatever the constituent is at logical form that is interpreted as the quantifier's restrictor, no overt lexical material appears within it.

clue as to what situations are in the domain of quantification, I mean that, at logical form, no material whose meaning is lexically determined appears within the quantifier's sister. At logical form, the sister of the adverbial quantifier, the item interpreted as the quantifier's restrictor, consists solely of an anaphor. The indefinite in particular remains *in situ* and is accordingly interpreted as being part of the quantifier's scope.

There are alternative approaches, however. The most simple-minded one would be to say this: sentences containing adverbial quantifiers express quantification over individuals because adverbial quantifiers really do quantify over individuals; sentences like *A blue-eyed bear is usually intelligent* express quantification over blue-eyed bears because, at logical form, the predicate *blue-eyed bear* is sister to the quantifier *usually* and accordingly interpreted as its restrictor. This would be quite a different approach. On my view, an adverbial quantifier ranges over situations only; on this alternative view, an adverbial quantifier can range over individuals. On my view, the domain of an adverbial quantifier is determined exclusively by the pragmatics⁶³; on this alternative view, it is determined by the syntax. This view would have it that sentences like the familiar (1a) and (1b) are perceived as equivalent because their syntax at logical form and the semantics of their constituents at logical form are identical:

- (1) a. A blue-eyed bear is usually intelligent.
- b. Most blue-eyed bears are intelligent.

This simple-minded alternative quite obviously explains how it is that sentences containing adverbial quantifiers express quantification over individuals. Implementing it is not so straightforward. Making it work requires a certain amount of cutting and pasting on

⁶³ In the simple cases that we have been considering, that is: I imagine that *when*-clauses do restrict

the way to logical form: in some way, we have to get the predicate *blue-eyed bear* to form a constituent together with *usually* (a constituent essentially no different from *Most blue-eyed bears*); and, at the same time, we have to make sure that this constituent also combines with a predicate of individuals (a constituent essentially no different from *are intelligent*). But in principle it is an option.

I bring up the simple-minded alternative here because its rough outlines are similar enough to actual alternatives in the literature. These alternatives are closely associated with a view of indefinites developed in Heim 1982 and Kamp 1981 that is essentially different from the view I am advocating here. (Heim and Kamp themselves drew on Lewis' (1978) view of the semantics of adverbial quantification.) Like the simple-minded alternative, the actual alternatives differ from my proposal in that: they claim that the units that adverbial quantifiers range over need not be situations; they claim that the indefinite determines the quantifier's restriction syntactically, by being part of a constituent at logical form that is interpreted as the quantifier's restrictor. The existing proposals are quite sophisticated, and, in the ensuing few sections, I will not address them as they are formulated. Rather, I will describe a straw man that mimics the system in Heim 1982 and point out what is wrong with it. The straw man has the features of the simple-minded alternative – it allows adverbial quantifiers to quantify over individuals, and it posits logical forms for sentences with adverbial quantifiers that are basically indistinguishable from logical forms for sentences with determiner quantifiers. As I go along, I will indicate the extent to which my arguments against the straw man apply to existing proposals in the literature, some of which resemble the straw man more closely than others do.

Arguing against theories that say that adverbial quantifiers range over individuals is only half my goal in this chapter. This is because, as it happens, there are others who share my view that adverbial quantifiers range over situations only, but who endorse

different accounts of quantificational variability. These competing accounts rely on a view of indefinites that is very different from mine; they pose an important threat to my view that indefinites carry a uniqueness presupposition. In the second half of this chapter, I discuss these alternative accounts.

A point of notation before starting. In sentences containing an adverbial quantifier and an indefinite, I shall occasionally speak of the individuals picked out by the indefinite's nominal predicate as *I-individuals*. For example, when I mention I-individuals while discussing the sentence *A blue-eyed bear is usually intelligent*, I am talking about blue-eyed bears.

2. Arguments against alternatives involving quantification over individuals

2.1. The Straw Man

In this section I will roughly and informally outline an alternative analysis to the one I proposed -- an analysis under which adverbial quantifiers are permitted to quantify over individuals, and indefinites that give rise to quantificational variability are interpreted as restrictors of these quantifiers. This straw man is very loosely based on the system in Heim 1982, and I will use it to represent a whole family of analyses deriving from Heim 1982 and Kamp 1981. In the coming sections, I will argue against this analysis; I will note where existing proposals in the literature successfully withstand my arguments.

The Straw Man is designed to create strong parallels between the syntax and interpretation of sentences with determiner quantifiers, on the one hand, and sentences with adverbial quantifiers and indefinites, on the other.

First here are the components of the Straw Man that have to do with the logical form and interpretation of nominal predicates and determiner quantifiers:⁶⁴

To begin with, the Straw Man makes a claim about the logical forms in which nominal predicates (like *blue-eyed bear*) appear. At the level of logical form, wherever one finds a nominal predicate, one finds adjoined to it a variable of the type of individuals.

(2) At the level of logical form, individual variables are adjoined to nominal predicates.

(3) [x [blue-eyed bear]]

In conjunction with this, it makes a claim about the logical form and interpretation of determiner quantifiers. On the Straw Man's view, the arguments of a quantifier are not predicates (i.e. functions from entities to truth-values), as I have been assuming; rather, they are expressions of the type of truth values, and contain free variables. Quantifiers are indexed with the variables that are free in their restrictor and their scope. The first argument of a determiner quantifier is created by adjoining an individual variable to a nominal predicate:

(4) Most _{x} [x [blue-eyed bear]]

⁶⁴ Although this is a straw man, it is worth saying something about the structure-changing operations that it makes use of. On the Straw Man's view, it could very well be that the system responsible for the manipulations of structure that I describe here -- adjunction of individual variables to nominal predicates, adjunction of indefinites to quantifiers -- is not the system initially responsible for generating syntactic structure. The Straw Man does not intend to make any claim about what the system is that generates logical forms, although he does assume that the structures that are manipulated in generating logical forms are derived from some stage of the initial computation.

The second argument is created by taking the constituent made up of the quantifier and its first argument, adjoining it to a higher node in the tree, and leaving in its original position an individual variable identical to the variable in the quantifier's first argument⁶⁵. So a sentence like *Most blue-eyed bears are intelligent* has a (simplified) logical form like the one in (5):

$$(5) \quad [\quad [\text{Most}_x [x[\text{blue-eyed bear }]]] \quad [t_x \text{ be-intelligent }] \quad]$$

Determiner quantifiers quantify over assignments of values to the variables that they are indexed with, but informally we can write:

(6) *The Straw Man's view of determiner quantifiers.*

Determiner quantifiers apply to two arguments of the type of truth values.

$[[\text{DETQ}_x]](p)(q) = 1$ iff δ individuals a such that $[\lambda x p] (a) = 1$ are such that

$[\lambda x q] (a) = 1$.

(where δ is a proportion that depends on the quantifier)

For example:

(7) $[[\text{most}_x]](p)(q) = 1$ iff most individuals a such that $[\lambda x p] (a) = 1$ are such that

$[\lambda x q] (a) = 1$.

⁶⁵ I represent it below in the way that one sometimes represents traces.

The consequence is that (5) is predicted to be true iff most individuals that are blue-eyed bears are intelligent.

Now, here are the parallel components that have to do with the logical form and interpretation of indefinites and adverbial quantifiers.

First of all, the indefinite determiner has *no* interpretation. This means that the expression *a blue-eyed bear* (which has the logical form in (8)⁶⁶) has exactly the same interpretation as the nominal predicate *blue-eyed bear*.

(8) $a [x[\text{blue-eyed bear}]]$

Second of all, adverbial quantifiers, like determiner quantifiers, take arguments that are of the type of truth values (and contain free variables). What is different about adverbial quantifiers is that they bind *unselectively* -- they quantify over δ -tuples of individuals, and are indexed with the variables that are free in their restrictor and their scope.

(9) *The Straw Man's view of adverbial quantifiers.*

Adverbial quantifiers apply to two arguments of the type of truth values.

$[[\text{ADVQ}_{\langle x_1, x_2, \dots \rangle}]](p)(q) = 1$ iff δ -tuples of individuals $\langle a_1, a_2, \dots \rangle$

such that $[\lambda x_1 \lambda x_2 \lambda x_3 \dots p](a_1)(a_2)(\dots) = 1$

are such that $[\lambda x_1 \lambda x_2 \lambda x_3 \dots q](a_1)(a_2)(\dots) = 1$.

⁶⁶ Alternatively, one could say that the determiner is deleted altogether, so that the logical form of *a blue-eyed bear* is to all intents and purposes no different from the one in (3).

(where δ is a proportion that depends on the quantifier)

For example:

(10) $[[\text{usually}\langle x_1, x_2, \dots \rangle]](p)(q) = 1$ iff most n -tuples of individuals $\langle a_1, a_2, \dots \rangle$

such that $[\lambda x_1 \lambda x_2 \lambda x_3 \dots p](a_1)(a_2)(\dots) = 1$

are such that $[\lambda x_1 \lambda x_2 \lambda x_3 \dots q](a_1)(a_2)(\dots) = 1$.

Finally, in the creation of logical form, indefinites move to a position where they are interpreted as the first argument of a quantifier. Specifically, they adjoin to the quantifier.^{67, 68} They leave behind a variable identical to the variable adjoined to the indefinite's nominal predicate. This means that a sentence like *A blue-eyed bear is usually intelligent* will have a (simplified) logical form like the one in (8):

(11) $[[\text{Usually}\langle \lambda x [\text{blue-eyed bear } x] \rangle]] [t_x \text{ be-intelligent }]]$

And, given that the indefinite determiner is semantically vacuous, (11) is predicted to have exactly the same interpretation as the parallel sentence in (5).

I am going to criticize various properties of the Straw Man:

⁶⁷ Again, note that the Straw Man does not claim that the system that generates these logical forms is the same as the system initially responsible for generating syntactic structures. Heim 1982 called the operations that create logical forms "rules of construal."

⁶⁸ Or they move to a position where they are interpreted as a conjunct within the first argument of the quantifier. In this case they are adjoined to a constituent that is sister to the quantifier.

I will say that it assigns the wrong interpretation to sentences that contain adverbial quantifiers. For the Straw Man, adverbial quantifiers may quantify over individuals -- by virtue of the fact that they may be indexed with an individual variable. In particular, in sentences that exhibit quantificational variability, the quantifier is interpreted as quantifying over I-individuals -- by virtue of being coindexed with the individual variable adjoined to the indefinite's nominal predicate. I will argue that adverbial quantifiers do not quantify over individuals.

For the Straw Man, sentences that exhibit quantificational variability are (well nigh) indistinguishable in their logical form and interpretation from parallel constructions containing determiner quantifiers. (This is logically different from the claim that adverbial quantifiers quantify over individuals in these sentences). I will point out a problem for this view.

I will argue that the Straw Man is wrong to say that indefinites have denotations of the type of truth-values.

I will point out another wrong prediction of the Straw Man: in sentences that exhibit quantificational variability, it predicts that pronouns that appear to depend on the indefinite for their value are coindexed with the indefinite's variable and thus have the status of bound variables.

2.2. Adverbial quantifiers do not quantify over individuals

Adverbial quantifiers, on my view here, range exclusively over situations. When they seem to quantify over the individuals in some set, that is just because there happens to be a one-to-one correspondence between the situations in the quantifier's domain and the

elements of that set. The opposing view is that adverbial quantifiers can range over individuals. What could distinguish between the two views?

I claimed that the domain of an adverbial quantifier is determined by the pragmatics. Sometimes, adverbial quantifiers express quantification over individuals because the context provides a salient set of situations that the quantifier ranges over, and there is a one-to-one correspondence between the situations in this set and the individuals in another salient set. Sometimes -- in those cases that have been in the spotlight here -- default strategies that we use to determine a domain settle in the end on a domain that is in one-to-one correspondence with a set of individuals. This means that we should be able to distinguish between the two views if we look at the broader context in which a sentence containing an adverbial quantifier occurs. First, note that if an adverbial quantifier quantifies over individuals, then presumably its domain can be restricted by the context in the same way that the domain of a determiner quantifier can be. Now, suppose we find that adverbial quantifiers seem to quantify over the individuals in a contextually salient set even when there is no contextually salient set of situations around that the individuals are in a one-to-one correspondence with. (And when we could not obtain such a set of situations by using our default strategies.) That would suggest that adverbial quantifiers really *do* quantify over individuals. But suppose we find that adverbial quantifiers seem to quantify over the individuals in a contextually salient set only when there *is* a contextually salient set of situations that the individuals are in a one-to-one correspondence with. (Or when we could obtain such a set by using our default strategies.) That would suggest that adverbial quantifiers quantify over situations and not individuals.

In this section I will argue that what we find is the second thing. An adverbial quantifier cannot behave as though it quantifies over individuals in a contextually salient set *unless* there is a one-to-one correspondence between the elements of that set and the

elements of a contextually salient set of situations. The conclusion is that adverbial quantifiers quantify over situations, not individuals.

2.2.1. *Salient sets of individuals do not restrict the domain of adverbial quantifiers; salient sets of situations do.*

There is a naturalness argument that adverbial quantifiers do not quantify over individuals, and one can make it even without establishing that a one-to-correspondence between salient individuals and salient situations is the apparent prerequisite for quantification over salient individuals. The argument basically runs like this: if adverbial quantifiers range over *individuals*, the conditions under which the context can delimit their domain are bizarre and unexpected; if they range over *situations*, however, there is nothing surprising about the way in which the context contributes restrictions. I will make this argument first -- I think it is convincing on its own -- and then proceed to the stronger one. At the same time, the facts that I will present here do suggest that an adverbial quantifier appears to quantify over individuals in a contextually salient set only when a set of situations in one-to-one correspondence with these individuals is also contextually salient. (A note of documentation: von Stechow 1996 makes the same point, and also cites the example in (12) to make it, though he doesn't present the argument in full.)

One way of presenting the facts is to present them as a puzzle. The contrast in (12) -- due to Krifka 1987 -- shows that, although a salient set of individuals seems to be able to restrict the domain of a determiner quantifier, it does not seem to be able to restrict the domain of an adverbial quantifier. In (12), the context sentence *There were lions and tigers in the cage* makes salient the set of lions and tigers in the cage (and also, I assume, the subsets consisting of the lions in the cage and the tigers in the cage, respectively.)

However, unlike (12a), (12b) does not make a claim about the proportion of lions *in the cage* that had a mane. This is unexpected if an adverbial quantifier ranges over individuals in the same way that a determiner quantifier does.

- (12) *Context sentence*: There were lions and tigers in the cage.
- a. Most lions had a mane.
 - b. # A lion usually had a mane.

Now consider the sentences in (13). The relevant difference between (12) and (13) is merely that the context has been enhanced. However, in (13), unlike in (12), the sentence with the adverbial quantifier *does* make a claim about the lions in the cage.

- (13) *Context sentences*: There were lions and tigers in the cage. I inspected them one by one to see if they had a mane.
- a. Most lions had one.
 - b. A lion usually had one.

If we take adverbial quantifiers to quantify over individuals, this refines the puzzle somewhat, but does not make it any less puzzling. The facts in (13) would show that it is not *impossible* for a salient set of individuals to restrict the domain of an adverbial quantifier, but (12) and (13) taken together would show that the conditions under which this can be done are bizarre and mysterious.

To summarize, the sentences in (12) show that a sentence containing an adverbial quantifier is not always able to convey information about a restricted set of individuals. The (dramatic) contrast between (12) and (13) shows that a sentence containing an

adverbial quantifier *is* apparently able to convey information about a restricted set of individuals when the context makes salient a set of *occasions of inspection, each of which contains one of these individuals*. This only poses a puzzle, however, if adverbial quantifiers quantify over individuals. It is quite unsurprising if sentences with adverbial quantifiers convey information about individuals *by* conveying information about situations that include individuals. A salient set of objects of a certain kind can always restrict the domain of a quantifier that ranges over objects *of that kind*. A set of individuals can restrict the domain of a quantifier over individuals, and a set of situations can restrict the domain of a quantifier over situations. Determiner quantifiers may quantify over individuals, and thus a salient set of individuals can restrict the domain of a determiner quantifier. Adverbial quantifiers *cannot* quantify over individuals, and so a salient set of individuals cannot restrict the domain of an adverbial quantifier; however, since they quantify over situations, a salient set of situations (occasions of inspection, for example) can restrict their domain.⁶⁹

In short, if adverbial quantifiers quantify over situations, we can maintain that adverbial quantifiers and determiner quantifiers do not differ essentially in their ability to admit contextual restrictions. If adverbial quantifiers quantify over individuals, we cannot, and are forced to say that the two kinds of quantifiers differ from each other in mysterious ways and for unclear reasons.

⁶⁹ This said, it is not transparent what my account has to say about examples like (13b). The set of situations that the quantifier ranges over cannot be the entire set of occasions of inspection, because this would conflict with the uniqueness presupposition of the indefinite: the presupposition requires each situation in the domain of quantification to contain a single lion, and presumably some occasions of inspection contain a single tiger and no lion. I can see two options -- either assume that the context makes salient the set of occasions of *lion* inspection, or assume that the context makes salient a set of situations each of which includes a single occasion of lion inspection, but the whole of which encompasses all the occasions of inspection. The tendency to contrastively focus *lion* in (13b) might indicate that the situations in the domain of quantification also include tigers, and this might favor the latter option.

2.2.2. *Adverbial quantifiers appear to quantify over contextually salient individuals only when there is a one-to-one mapping between these individuals and contextually salient situations.*

Even after the argument I just presented, there might be some skeptics around who still think that adverbial quantifiers are permitted to quantify over individuals and are willing to grant that some quantifiers are more selective than others in the restrictions that they accept. They could still respond like this: Adverbial quantifiers *do* quantify over individuals, but only sets of *especially* salient individuals can restrict their domain, and what it means for an individual to be *especially* salient is to be in a salient situation. Still, I hope, these skeptics would be swayed if it could be demonstrated that all those cases where an adverbial quantifier appears to quantify over individuals in a contextually salient set are cases where a set of situations in one-to-one correspondence with these individuals is also contextually salient.

So far, I presented some evidence for this, but my evidence was not really complete. I first considered a sentence with an adverbial quantifier in a context where there

was a contextually salient set of individuals and no contextually salient set of situations⁷⁰, and showed that the adverbial quantifier does not behave as though it ranges over the salient individuals. I then considered the sentence in a context with a contextually salient set of individuals and a contextually salient set of situations in one-to-one correspondence with these individuals, and showed that there the adverbial quantifier *does* behave as though it ranges over the salient individuals. But I didn't consider the sentence in a context with a contextually salient set of individuals and a contextually salient set of situations that is *not* in one-to-one correspondence with these individuals. This section is to fill the gap in the evidence.

To fill the gap, I will here consider a case where the context makes salient both a set of individuals and a set of situations that together include those individuals. I consider two subcases. In one subcase, there is a one-to-one correspondence between the salient situations and the salient individuals. In the other subcase, there is (crucially) *no* one-to-one correspondence between the salient situations and the salient individuals. I consider a sentence with an adverbial quantifier and an indefinite that is evaluated against these two backgrounds. When the sentence is evaluated against the first background, the adverbial quantifier behaves as though it quantifies over individuals in the salient set. But, when it is evaluated against the second background, the adverbial does *not* behave as though it quantifies over individuals in the salient set. This implies that, for an adverbial quantifier to behave as though it quantifies over individuals in a contextually salient set, there *must* be a one-to-one correspondence between the individuals apparently in its domain and the situations in a contextually salient set. And the natural conclusion from this

⁷⁰ Possibly there is a contextually salient set of situations, but it's a singleton set: the context sentence describes a single situation. Note that I must assume that, even if this situation *is* salient, we are more likely to partition the actual world than this situation when we were trying to identify a value for P_x .

is of course that, when adverbial quantifiers seem to be quantifying over individuals, they are actually quantifying over situations.

The example I will use is the example of Danny and the blue-eyed bears, which we encountered already in Chapter 2. Recall the picture. Danny is a subject in an experiment. He watches as blue-eyed bears walk out from behind a screen and then walk behind it again, one at a time, and his task is to say whether the bear that just walked out is intelligent or not. Now here are two possible ways in which the experiment could turn out:

Scenario One. In Scenario One, a different blue-eyed bear walks out each time. For most of those bears, it is quite clear to Danny whether or not they are intelligent. For concreteness, let's say the actual numbers are as follows: there are 50 bears total; for 40 of those bears, it is absolutely clear to Danny (for whatever reason) whether they are intelligent or not; for 10 of them he hasn't the faintest idea (and says so). So, 10 out of 50 times that Danny is confronted with a blue-eyed bear, he has no idea whether the bear he is confronted with is intelligent, and, 40 out of 50 times that he is confronted with a blue-eyed bear, he knows whether the bear that he is confronted with is intelligent.

Scenario Two. In Scenario Two, sometimes the same blue-eyed bear walks out more than once. Now, it is still true that most of the bears that Danny is confronted with are transparently intelligent or unintelligent. But what is remarkable about this scenario is that, as it happens, Danny is confronted most of the time with blue-eyed bears whose intelligence he is unsure of. They just walk out much more often than the other bears do. Let's say the actual numbers are as follows: there are 10 bears total; for 8 of those bears, it is absolutely clear to him (for whatever reason) whether they are intelligent or not; for 2 of those bears he hasn't the faintest idea. But those two bears of unfathomable intelligence walk out from behind the screen a total of 40 out of 48 times, and all the others one time

each. So, 40 out of 48 times that Danny is confronted with a blue-eyed bear, he has no idea whether the bear he is confronted with is intelligent, and, 8 out of 48 times that he is confronted with a blue-eyed bear, he knows whether the bear that he is confronted with is intelligent.

We are going to evaluate a single sentence against the backgrounds given by both these scenarios.

Before proceeding, notice that these scenarios make salient both a set of situations - the set of occasions where Danny is confronted by a blue-eyed bear -- and a set of individuals -- the set containing Danny and the blue-eyed bears that he is confronted with. Both these sets can be used to restrict the domain of quantifiers. For instance, when we evaluate (14) against either of these backgrounds, we naturally understand it as making the claim that, on most occasions *when Danny was confronted with a blue-eyed bear*, he took thirty seconds to respond. The adverbial quantifier in (14) thus quantifies over situations that are members of the salient set of situations.

(14) Danny usually took under thirty seconds to respond.

When we evaluate (15) against either of these backgrounds, we naturally understand it as making the claim that most of the blue-eyed bears *in the experiment* did not understand the purpose of the experiment. The determiner quantifier in (15) thus plausibly quantifies over blue-eyed bears that are members of the salient set of individuals.

(15) Most blue-eyed bears did not understand the purpose of the experiment.

Notice at the same time that there is an important difference between the two scenarios. In Scenario One, the salient situations and the blue-eyed bears in the salient set of individuals are in a one-to-one correspondence: no two scenarios contain the same blue-eyed bear. By contrast, in Scenario Two, the salient situations and the blue-eyed bears in the salient set of individuals are not in a one-to-one correspondence: it often happens that the same blue-eyed bear appears in more than one situation.

Now, the sentence that we have to evaluate against these two backgrounds is (16). (Or alternatively the variant in (16').) The crucial fact is this. If we consider (16) evaluated against the background of Scenario One, we think that it truly reports some of the results of the experiment. But if we consider (16) evaluated against the background of Scenario Two, our opinion is quite different. The intuition is that (16) is *not* a true report of any of the experimental results (and the same goes for the variant in (16')).

(16) Danny usually knew whether a blue-eyed bear was intelligent.

(16') Most of the time, Danny knew whether a blue-eyed bear was intelligent.

This pattern of judgments is unsurprising if the adverbial quantifier in (16) always quantifies over salient situations. After all, in Scenario One, it is true that, on most occasions when Danny was confronted with a blue-eyed bear, he knew whether the bear that he was confronted with was intelligent. (This happened on 40 out of 50 occasions.) However, in Scenario Two, it is *not* true that, on most occasions when Danny was confronted with a blue-eyed bear, he knew whether the bear that he was confronted with

was intelligent.⁷¹ (This happened on only 8 out of 48 occasions.) But the pattern of judgments is surprising if the adverbial quantifier in (16) can quantify over salient individuals. Suppose that, when evaluating (16) against both backgrounds, we take the adverbial quantifier in (16) to quantify over individual salient blue-eyed bears. Then we expect (16) to be true on *both* scenarios. Why? Different theories may assign different logical forms to sentences like (16), and therefore different truth conditions.⁷² Still, I take it that, if *usually* were to quantify over salient blue-eyed bears, any reasonable theory would predict (16) to be true if the majority of blue-eyed bears in the salient set of individuals are such that Danny knew at some point during the experiment whether they were intelligent. Now, the salient set of individuals is the set of individuals involved in the experiment (Danny and the bears), and it is true in *both scenarios* that a large majority of the individual blue-eyed bears in the experiment are such that Danny knew whether they were intelligent. After all, in Scenario One, 40 out of the 50 bears bears in the experiment were such that Danny knew whether they were intelligent, and, in Scenario Two, 8 out of the 10 bears in the experiment were such that Danny knew whether they were intelligent.

⁷¹ Note that it isn't important for my argument here whether we take (16) to be false or inappropriate on Scenario Two: all that matters is that we don't take it to be true, and thus that the quantifier cannot be construed as quantifying over salient individuals. Whether (16) is false or inappropriate is relevant to the discussion of this example in Chapter 2, but has no bearing on the argument here.

⁷² Here is a sample logical form that differs minimally from the one I intended to propose in the appendix I planned to Chapter 3 in that the adverbial quantifies over individuals I have ignored tense in the embedded clause.

(i) $\lambda s_0 [\text{PAST } s_0 [\lambda s_1 [\text{usually } [[F_x] [\text{b-e-b}]] [\lambda x [\exists [\lambda s \text{ sCs}_1] [\lambda s_2 \text{ Danny know } s_2 \Sigma]]]]]]$
 where Σ is:
 the [answer $s_2 [Q_n \lambda s_3 [\text{AFF}_n [x \text{ be-intelligent } s_3]]]]$

Obviously I can't go into the full details in a footnote, but the truth conditions of (i) are:

(ii) $[[(i)]](s) = 1$

iff

there is a situation s' temporally preceding s such that
 for most x such that x is a blue-eyed bear and $[[F_x]](x) = 1$,
 there is a situation s'' in s' such that

either

x is intelligent at s' and

(this is shorthand) Danny believes at s' that x is intelligent at s'

or

x is not intelligent at s' and

(this is shorthand) Danny believes at s' that x is not intelligent at s' .

It seems, then, that, when we evaluate (16) against the background in Scenario One, we take it to convey a claim about most blue-eyed bears in the experiment, but, when we evaluate it against the background in Scenario Two, we don't. The difference between Scenario One and Scenario Two is that there is a one-to-one correspondence between salient situations and salient blue-eyed bears in Scenario One, but none in Scenario Two. In short, what we observe from considering (16) in both these scenarios is that there is a necessary condition on when we take a sentence containing an adverbial quantifier to express quantification over a set of salient individuals: there must be a one-to-one correspondence between these individuals and a salient set of situations. This is a very strong indication that adverbial quantifiers actually quantify over situations and not individuals. If adverbial quantifiers are allowed to range over individuals, and their domain can in principle be restricted by a contextually salient set of individuals, we must stipulate a very suspicious extra condition on *what* individuals can be in their domain, *a condition that links every individual in the domain to a distinct salient situation*. If adverbial quantifiers only range over situations, and their domain can be restricted by a contextually salient set of situations, we of course don't need to stipulate any extra condition on what can count as a domain of quantification. The facts fall out naturally.

2.2.3. Summary of the argument

We can summarize the argument as follows. A sentence containing an adverbial quantifier can apparently express quantification over the individuals in a contextually salient set. ((13b) shows this, and so does (16) evaluated in Scenario One.) However, it can do so *only* when there is a contextually salient set of situations in one-to-one correspondence with these individuals. ((16) evaluated in Scenario Two shows this.) This shows that, when an adverbial quantifier appears to range over a contextually salient set of individuals, it is

actually ranging over a contextually set of situations. So adverbial quantifiers that apparently express quantification over the individuals in a contextually salient set must actually be quantifying over situations, not individuals. Conclusion: Adverbial quantifiers quantify over situations, not individuals.

A true believer in the thesis that adverbial quantifiers can range over individuals could still respond. He could say that it is true that adverbial quantifiers that appear to quantify over individuals *in a contextually salient set* actually quantify over situations, but that there are adverbial quantifiers that truly range over individuals, and these allow no contextual restriction whatsoever. But I don't see what this view would buy us, and consider it a desperate attempt to cling to faith.

2.2.4. *Consequences for alternative views of quantificational variability*

I have now argued against one aspect of the simple-minded alternative to quantificational variability -- that adverbial quantifiers are capable of quantifying over individuals only. To what extent have I argued against real proposals in the literature?

Heim 1982, Kratzer 1995 and Diesing 1992 all take the view that adverbial quantifiers can quantify over individuals only. The first of these only briefly considers quantificational variability of the kind we have dealt with (pp. 190 ff.) but entertains an analysis where the adverbial quantifies over individuals, and the latter two explicitly assume that this is what happens in sentences with predicates like *intelligent*. So in this sense they are just as culpable as the Straw Man.

But some accounts that belong to the same general school of thought regarding the properties of adverbial quantifiers and/or the nature of indefinites take a more complicated

view. On these accounts, adverbial quantifiers never quantify over individuals *only* ; however, they may quantify over pairs of individuals and entities that (brazenly ignoring some severe ontological differences) we can regard as situations. Chierchia 1995a is among these, and to a certain degree Lewis 1975 appears to be as well. To argue against these proposals, I would have to show that sentences that contain adverbial quantifiers apparently quantify over salient *situation-individual pairs* only when there is a one-to-one mapping between these and salient situations (i.e. when there is one individual per situation). It is hard to show this without an independent criterion for saying that a set of situation-individual pairs is salient. In a later section, I will suggest that some sentences with adverbial quantifiers and indefinites are inappropriate in a context where the salient situations contain more than one I-individual each; if we imagine that every individual in a salient situation is salient, and that pairs of salient individuals and salient situations are themselves salient, we might try to build an argument on this. It is also worth pointing out (and de Swart 1991 does) that on these accounts, situation variables are suspiciously privileged, since adverbial quantifiers seem to have to be indexed with a situation variable irrespective of whether they are indexed with any others -- but this is not exactly a knockdown argument. On the whole, I think it will not be easy to settle this matter conclusively.

2.3. Adverbial quantifiers are different from determiner quantifiers

The Straw Man intertwines three claims -- that adverbial quantifiers may quantify over individuals, that determiner quantifiers quantify over individuals, and that the logical form and interpretation of sentences that exhibit quantificational variability are just like the logical form and interpretation of sentences with determiner quantifiers. The first of these I have just argued against. It turns out that the second is also debatable, though I won't get into this here (see Krifka 1990). Is it possible to maintain just the third? No. In this section, I

will mention a fact that is mysterious at the moment,⁷³ but that makes the point that sentences that exhibit quantificational variability should not be given a treatment exactly parallel to the treatment of sentences with determiner quantifiers.

The fact is that the nominal predicate of a quantificationally variable indefinite⁷⁴ must be evaluated in the most local context, while the nominal predicate of a determiner quantifier is not so restricted. Here is an example of what I mean.

(18a), which exhibits quantificational variability, is nonsensical as a conclusion based on (17) because the belief of John's that (18a) describes cannot be about individuals whom we take to be professors but John does not. (The acceptability of (18b) shows that there is no general problem with quantificational variability sentences in the kind of environment that (18a) provides.) Similarly, (19a) is gibberish, because the antecedent seems to contain a contradiction: the counterfactual cannot range over alternative ways the world might be in which those people who are physicists the way the world is now are linguists instead. (The acceptability of (19b) shows that there is no general problem with quantificationally variable indefinites in such constructions.)

(17) John mistakenly believes that the professors in my department are janitors.

(18) a. # He consequently believes that a professor in my dept always owns a good mop.

b. John believes that a janitor in my dept always owns a good mop.

⁷³ I do happen to have a solution, however, and hope to commit it to paper sometime in the near future.

⁷⁴ I introduced this term in the introduction. It's just shorthand for an indefinite in a sentence that exhibits quantificational variability.

(19) a. ?? If a physicist was always a linguist instead, a lot more would get done in our field (though we probably wouldn't know much about elementary particles).

b. If a physicist was always a linguist *as well*, a lot more would get done in our field.

By contrast, restrictors of strong determiner quantifiers may be interpreted *de re*: clauses containing these quantifiers may talk about individuals whom we take to possess the NP property (and who do not possess the NP property in the local context). There is thus a contrast between (18a) and (18'a). (18'a) seems to be acceptable as a conclusion on the basis of (17), because (18'a) can describe a belief of John's about individuals whom we take to be professors but he does not. Similarly, there is a contrast between (19a) and (19'a). The antecedent in (19'a) does not contain a contradiction, because in (19'a) the counterfactual can range over alternative ways the world might be in which those people who are physicists the way the world is now are linguists instead.

(18') a. He consequently believes that every professor in my dept owns a good mop.

(19') a. If every physicist was a linguist instead, a lot more would get done in our field (though we probably wouldn't know much about elementary particles).

For the moment, this simply goes to make the point that sentences that exhibit quantificational variability should not be given a treatment exactly parallel to the treatment of sentences with determiner quantifiers.

2.4. *Indefinites are individual-denoting*

This argument against the Straw Man comes from coordination. Consider the sentence in (20):

- (20) It is all too frequently the case that John and a person from my department hate each other.

If QV indefinites are truth-value denoting expressions, as on the Straw Man view, they can't be interpreted as conjoined with individual-denoting expressions. So the Straw Man predicts that the indefinite has to raise out of the conjunct in (20). This itself is problematic, however, because extraction from a coordinate structure is unlike any known instance of movement (including movement at logical form.) On my account, of course, indefinites are themselves individual-denoting expressions, so the problem doesn't arise.

2.5. *Pronouns dependent on QV indefinites behave more like coreferential expressions than like bound variables coindexed with a trace.*

Consider the sentences in (21). It is very difficult, if at all possible, to take these sentences to express that most students are liked by their office mates.⁷⁵ On an account where indefinites are interpreted as quantifier restrictors, it seems natural to attribute the marginality of this interpretation to weak crossover. Indeed, on the Straw Man view, I

⁷⁵In this, they contrast with the sentences in (i):

- (i) a. It is usually the case that a student's office mate likes him.
b. Usually, a student's office mate likes him.

The sentences in (i) are themselves not perfection on the intended reading, however, and so I have avoided putting (i) in the text. As below, putting focus on a constituent that includes the pronoun improves the sentences. The sentences in (ii) seem to me to be absolutely fine on the intended reading.

- (ii) a. It is usually the case that a student's office mate likes only [HIM]_F.

think that, aside from the identity of the quantifier (and the presence of a vacuously interpreted indefinite determiner in (21b)), there is no difference at the level of logical form between (21b) and the crossover sentence in (22). Both receive a logical form of the kind in (23).⁷⁶ So if the weak crossover constraint is a constraint on configurations at logical form and (22) exhibits weak crossover, then (21b) *must* exhibit weak crossover.

(21) a. ?# It is usually the case that his office mate likes a student.

b. ?# Usually, his office mate likes a student.

(22) # His office mate likes every student.

(23) $Q_{\langle x_1 \rangle} [(a) x_1 \text{ student}] [[\text{his}_1 \text{ office mate}] \text{ likes } x_1]$

But quantificational variability sentences of this kind do *not* have the same status as parallel sentences involving bound variable pronouns and a quantificational phrase in the position of the indefinite. I think there is already an intuition that the sentences in (21) are not as bad as the one in (22). Moreover, under conditions that improve backwards coreference but not variable binding, we find that sentences involving quantificationally variable indefinites improve. Indeed, the quantificational variability sentences seem to behave just like sentences involving dependent definite descriptions. This is indicated by the sentences in (26). In (26), the indication of focus structure is probably the factor that improves the examples: focus on a constituent that includes the pronoun and excludes the pronoun's antecedent conveys that the antecedent was present in a proposition or question in the prior discourse.

b. Usually, a student's office mate likes [HIM]_F.

⁷⁶It is conceivable that abbreviations in (23) obscure relevant details. Possibly the position of the quantifier is higher in (21b) than in (23); I don't know what exactly would be the relevance of this, however.

- (24) a. ?# His office mate likes John.
 b. Only [his OFFice mate]_F likes John.
- (25) a. ?# In every class, his office mate likes the brightest student.
 b. In every class, only [his OFFice mate]_F likes the brightest student.
- (26) a. ?# Usually, his office mate likes a student. (= (21b))
 b. Usually, only [his OFFice mate]_F likes a student.
- (27) a. # His office mate likes every student. (= (22))
 b. # Only [his OFFice mate]_F likes every student.

So at least if weak crossover is a condition on representations that involve a bound variable pronoun and a coindexed variable in the surface position of the quantifier, we have to reject the idea that sentences like those in (21) involve a bound variable pronoun and a coindexed trace in the position of the indefinite. This means that we have to reject at least the most apparent way of implementing the idea that quantificationally variable indefinites are quantifier restrictors. By contrast, if the indefinite is an individual-denoting expression that contains a dependency, it follows immediately that the pronoun need not be a bound variable, and the parallel between examples like (25) and examples like (26) is transparent.

3. Alternatives that involve quantification over situations

3.1. Existential analyses of indefinites: a brief survey of the competition

I have now presented reasons for thinking that quantificational variability does not involve quantification over individuals, but rather quantification over situations. In the process, I have argued against theories where indefinites have meanings, and positions at logical form, that allow them to function as restrictors to quantifiers over individuals.

But it would be wrong to stop here. In the literature, there are in fact alternative views of quantificational variability under which adverbial quantifiers quantify over situations rather than individuals. What I have presented so far does not argue for *my* analysis over any of these alternatives. These alternative proposals treat indefinites as existential quantifiers, so, to the extent that they are viable, they cast suspicion on my view that indefinites are functions from situations to individuals. In this section, I will address these alternative proposals.

The views that I will address here have the following properties in common, other than the fact that they treat adverbial quantifiers as ranging over situations:

First, they hold that natural language predicates express persistent properties of situations. If a predicate holds of one situation, it holds of any situation that includes it. To take an arbitrary predicate like *intelligent*, these views have it that, for all situations s_1 and s_2 and individuals x , if $[[\text{intelligent}]](s_1)(x) = 1$ and s_1 is part of s_2 , then $[[\text{intelligent}]](s_2)(x) = 1$. As far as the meaning of *intelligent* goes, a predicate like *intelligent*, applied to an individual and a situation, tells you that the individual is intelligent at some point *within* (rather than for the full duration of) the situation.

Second, as I mentioned, they hold that indefinites are existential quantifiers. In other words, the lexical entry of the indefinite determiner *a* simply says: where P and Q are

predicates of individuals, $[[a]](P)(Q) = 1$ iff there is at least one individual c such that $P(c) = 1$ and $Q(c) = 1$.

Third, they hold that, in sentences that exhibit quantificational variability, *the content of the indefinite (partially) determines the restriction of the adverbial quantifier*. In particular, the domain of the quantifier consists of situations that satisfy some proposition in which an existential quantifier appears. For example, in the sentence *A blue-eyed bear is usually intelligent*, the domain of the quantifier consists of situations that satisfy some proposition that involves existential quantification over blue-eyed bears.

Von Stechow 1994, 1996 and, as far as I can see, de Swart 1995 endorse views of this kind. (De Swart's reference to "minimal events" is what leads me to believe that she takes the view that predicates express persistent properties of situations. Perhaps I am reading too much into it, however, so be warned that I may be putting words in her mouth that don't belong there.) I am selecting these views in particular because no other view that I am familiar with is spelled out in enough detail that I can discuss it without considerable exegesis. So I would like to stress that my intention here is not to bring an existential analysis of indefinites to its final resting place. In particular, I think that theories under which predicates do *not* express persistent properties of situations should still be open to discussion.⁷⁷ My strategy in the discussion to come will be as follows. At first, I will not directly address any existing proposal. Instead, I will outline an analysis that roughly imitates existing proposals, and that I think is as likely to succeed of any analysis that proceeds along the lines that I just set out. The analysis is thus somewhat sturdier than a straw man tends to be; let's call it a tin man. After introducing the Tin Man, I will show what the salient points of difference are between the Tin Man analysis and my proposal.

⁷⁷ De Swart 1991 and apparently Chierchia 1988 (which I haven't seen) are examples.

Once I have done that, I will briefly discuss existing proposals, and point out ways in which they actually fare worse than the tin man that I have constructed.

3.2. The Tin Man

The Tin Man is as close to my theory as any account can be that imitates the proposals I am up against. This is partially for reasons of exposition, but partially for reasons that I prefer not to go into until later. In particular, I would like to call attention to the following two similarities. First of all, the restrictive argument of an adverbial quantifier is determined exclusively by the pragmatics: it is an anaphor, just as on my account. Second of all, despite the fact that the indefinite determiner on the Tin Man account is at bottom an existential quantifier, its argument structure is a little more complicated than one might imagine: it selects for a situation argument in the same way that my indefinite determiner does. This complication in the argument structure of the indefinite determiner may seem like a violation of the spirit of the proposals that the Tin Man purports to represent. A major appeal of these proposals is the simplicity of the entry for the indefinite determiner. However, as we will see later, it avoids some problems that confront analyses where the indefinite determiner is a standard two-place quantifier.

There are three important components to the Tin Man:

The first has to do with the way it treats adverbial quantifiers. As we now have come to assume, adverbial quantifiers select for two arguments, both of which are predicates of situations, and the restrictive argument is an anaphor, whose value is determined by pragmatics. None of this is new. What is new is the semantics of adverbial quantifiers. According to the Tin Man, the set of situations that an adverbial quantifier ranges over is not (necessarily) the full set of situations that satisfy its first argument.

Rather, the quantifier ranges over *minimal elements* of this set. The *minimal* situations in a set of situations are those situations that do not include any of the others.

(28) Given a set Σ , the set of *minimal elements* of Σ , $MIN(\Sigma)$, is defined as follows

(cf. Berman 1987, Heim 1990):

$$MIN(\Sigma) = \{ s: s \in \Sigma \ \& \ \forall s' [s' \text{ is a proper part of } s \rightarrow s' \notin \Sigma] \}.$$

Adverbial quantifiers say that a certain proportion of *minimal situations that make their first argument true* are part of some *minimal situation that makes their first argument and second argument true*:

(29) *Adverbial quantifiers according to the Tin Man.*

Adverbial quantifiers apply to two arguments, each of which is a predicate of situations.

Where defined,

$$[[ADV]](p_S)(q_S) = 1 \text{ iff } \delta \text{ situations } s' \text{ such that } s' \in MIN(\{s: p_S(s) = 1\})$$

are part of some situation s'' , where $s'' \in MIN(\{s: p_S(s) = 1 \ \& \ q_S(s) = 1\})$.

(δ here is a proportion that depends on the adverb in question.)

As an illustration, consider the sentence *John usually wept*. The simplified logical form for the sentence is as in (30), where P_S is the anaphor that serves as the first argument of *usually*. According to the Tin Man, (30) says that most *minimal elements* of the set of P_S -situations are part of some *minimal element* of the set of P_S -situations in which John wept.

(30) usually P_s [λs [John weep s]]

The assumption that adverbial quantifiers quantify over *minimal* situations is intimately tied to the view that predicates express persistent properties of situations.⁷⁸ As von Fintel (1996) emphasizes, if we want at all to count situations that make a proposition true, we are going to have to count minimal situations that make it true. For instance, the sentence *John climbed Mt. Holyoke twice* “should obviously not be true in a world where John only climbed Mt. Holyoke once. But clearly, even if John climbed Mt. Holyoke only once, there will be many situations in which John climbed Mt. Holyoke [-- namely, all those situations that include the climb]...What we want to do is count *minimal* situations in which John climbed Mt. Holyoke, situations that have no proper parts in which John also climbed Mt. Holyoke.” (von Fintel 1996, p. 5).⁷⁹

The second important component of the Tin Man theory is the analysis it gives to the indefinite determiner. According to the Tin Man, the indefinite determiner is essentially a quantifier with existential force, but it is a little more complicated in its argument structure than quantifiers like *at least one* or *some*, which only select for two predicates of individuals. The indefinite determiner selects for a situation as well as two predicates of individuals, and it says that there is at least one individual *in the situation* that satisfies these two predicates.

⁷⁸ At the same time, locating the restriction to minimal situations in the entry *for the quantifier itself* rather than in the arguments of the quantifier might not be necessary. It depends on whether there is any material present in the logical form of the arguments of the quantifier that could accomplish the same thing. The logical forms that I will be assuming when I discuss the Tin Man theory are -- like the logical forms that existing proposals make use of -- quite simplified. In particular, they don't include tense information. Accordingly, I assume that the restriction to minimal situations comes from the semantics of the quantifier. I think it is important to note this, because I have the impression that another view of where minimal situations enter the picture might not be subject to the criticism that I level at the Tin Man.

(31) *Indefinite determiners according to the Tin Man.*

Indefinite determiners apply to three arguments, the first of which is a situation and the other two of which are predicates of individuals.

$[[a]](s)(P)(Q) = 1$ iff there is at least one individual c in s such that $P(c) = 1$ and $Q(c) = 1$.

So for instance take the sentence *A blue-eyed bear is usually intelligent*. On the Tin Man theory, the second argument of *usually* has the logical form abbreviated in (32). And $[[[32]]]$ is true in a situation s (i.e. $[[[32]]](s) = 1$) iff s contains at least one intelligent blue-eyed bear. (Note that the logical form of (32) omits tense information; I shall neglect tense information throughout, and this is something that proponents of the theories that the Tin Man represents actually tend to do. Also, note that although in (32) I have identified the situation argument of the indefinite determiner with the situation argument of the main predicate, I don't assume that the two *have* to be identified).

(32) $\lambda s [[[a s] \text{ blue-eyed bear }] \text{ be-intelligent } s]$

The third important component of the Tin Man theory is a claim about what the restrictor of an adverbial quantifier looks like in sentences that contain adverbial quantifiers and indefinites. Again, I will use some shorthand. When I talk about sentences that contain an adverbial quantifier and an indefinite, I will call the individuals that the indefinite's nominal predicate picks out *I-individuals*. For example, in the sentence *A*

⁷⁹ There are aspects of the semantics of (28) that I am not dwelling on here -- I haven't said anything about the condition that s ' be *part of a minimal p_s - and q_s -situation*. Von Stechow 1996 motivates this as well.

blue-eyed bear is usually intelligent, the I-individuals are blue-eyed bears. Now, the Tin Man claims that, when we evaluate sentences that contain an adverbial quantifier and an indefinite, we sometimes impose a constraint on what the quantifier's restrictive argument can be. The constraint is this: the value of the adverbial quantifier's restrictive argument must be such that *every situation of which it holds contains at least one I-individual*.

(33) *The Tin Man's Constraint (on sentences containing an adverbial quantifier and an indefinite):*

Each situation that satisfies the restrictive argument of the adverbial quantifier contains at least one I-individual.

Let's use our standard example again for illustration. The simplified logical form for the sentence is as in (34), where P_S is the anaphor that serves as the first argument of *usually*.

(34) usually P_S [λs [[a s blue-eyed bear] be-intelligent s]]

When the Tin Man's Constraint applies, every P_S -situation must contain at least one blue-eyed bear.

On the Tin Man's view, when we evaluate a sentence that contains an adverbial quantifier and indefinite, we sometimes have the *option* of applying the constraint in (33) and we sometimes *must* apply it, depending on the sentence in question. In fact, however, we don't have to worry here about when exactly we are forced to apply the Tin Man's Constraint, because when I discuss the Tin Man theory, I will always give the Tin Man the benefit of the doubt: if it is to his advantage to say that we apply the constraint obligatorily in a certain case, I will assume that we do, without question.

Though I don't need to talk about this in order to discuss the predictions of the account, I think it is important to emphasize that, on the Tin Man's view, the constraint in (6) actually derives from something else. What imposing the constraint in (33) boils down to is really manipulating the interpretation of the indefinite in a special way. The theories that the Tin Man is based on say that imposing the constraint on (33) results in some way from treating the indefinite as a *topic*, and that in some sentences but not in others, we are forced to treat the indefinite as a topic. (I will be more precise about this later on.) The Tin Man himself simply says that, in some sentences but not in others, there is a silent operator that applies to the indefinite, and the presence of this operator gives rise to the constraint. Here is the idea. In sentences where we impose the Tin Man's Constraint, a silent operator (TOP) appears as sister to the indefinite at logical form. So our standard sentence actually has not the logical form in (34) but rather the one in (35).

(35) usually P_s [λs [TOP[a *s* blue-eyed bear]] be-intelligent *s*]

This silent operator does nothing but impose a presupposition that is at first glance extremely benign. When it attaches to a constituent like *a s blue-eyed bear*, it imposes the presupposition that $[[a\ s\ blue\text{-}eyed\ bear]] (\lambda y\ y=y) = 1$, or in other words, merely that there is at least one blue-eyed bear in *s*.

(36) *The Tin Operator*.⁸⁰

⁸⁰ Note that the lexical entries of TOP imposes constraints on the quantificational expressions that TOP can attach to (because for some quantifiers *D*, it is not the case that $D(\lambda y\ y=y) = 1$). This could be of potential interest if we wanted to take TOP seriously, say, as a candidate for an operator that attaches to topicalized constituents. But as far as I am concerned TOP is just a device that happens to be of expository use in my presentation of alternative views.

TOP applies to a function from predicates of individuals to truth values and yields another function from predicates of individuals to truth values.

$[[\text{TOP}]](D)$ is defined only if $D(\lambda y y=y) = 1$.

Where defined, $[[\text{TOP}]](D) = D$.

But now presupposition projection does the rest of the work. As a result of the presupposition that TOP imposes and the way presupposition projection works in quantified constructions, we wind up with the presupposition that every P_S -situation contains at least one blue-eyed bear -- in other words, with the Tin Man's Constraint. Again, in the discussion to come, I will not worry about when we *have* to assign logical forms in which there is a silent operator, and when we merely have the option of doing so; I will always give the Tin Man the benefit of the doubt, and assume that there is a silent operator when this is to his advantage.

Now here is how the three components of the Tin Man theory conspire to give us quantificational variability -- on one additional assumption. Consider one more time our standard sentence, whose logical form is given (again) in (37). The Tin Man says that this is one of those sentences that contains the TOP operator, and hence where the Tin Man's Constraint applies; we will not question this.

(37) usually P_S [λs [TOP[[a s][blue-eyed bear]]] be-intelligent s]

The first step is this. The Tin Man's Constraint tells us that (37) presupposes that every P_S -situation contains at least one blue-eyed bear. In other words, if we want to evaluate this sentence at all, the value for P_S must be such that every situation in $\{s: [[P_S]](s) = 1\}$ contains at least one blue-eyed bear; otherwise, the denotation of the

sentence is undefined. When the context itself provides no salient set of situations, it is up to us to choose a value for P_S . What value do we choose? The Tin Man assumes that we simply take the entire set of situations that contain at least one blue-eyed bear each, and make the value of P_S the characteristic function of this set. That is, we choose a value for P_S such that the set of P_S -situations is the set of situations that contain at least one blue-eyed bear each. We choose a value such that $\{s: [[P_S]](s) = 1\}$ is $\{s: s \text{ contains at least one blue-eyed bear}\}$.

But once we choose this value for P_S , the semantics that we have for adverbial quantifiers and for indefinite determiners will guarantee that (37) is true if and only if most blue-eyed bears are intelligent. Here is why. The semantics of adverbial quantifiers ((29)) tells us that (37) is true under the conditions in (38):

- (38) $[[[(37)]]] = 1$ iff
 most minimal situations in $\{s: [[P_S]](s) = 1\}$ are part of some minimal situation in $\{s: [[P_S]](s) = 1 \ \& \ [[\lambda s [TOP [a \ s \ blue\text{-}eyed \ bear]] \ be\text{-}intelligent \ s]](s) = 1\}$.

But we just said that $\{s: [[P_S]](s) = 1\}$ is $\{s: s \text{ contains at least one blue-eyed bear}\}$. And recall from our brief discussion of the Tin Man's analysis of the indefinite determiner that $\{s: [[\lambda s [TOP [a \ s \ blue\text{-}eyed \ bear]] \ be\text{-}intelligent \ s]](s) = 1\}$ is $\{s: s \text{ contains at least one intelligent blue-eyed bear}\}$. So this means that (37) is true under the conditions in (39):

- (39) $[[[(37)]]] = 1$ iff

most minimal situations in $\{s: s \text{ contains at least one blue-eyed bear}\}$ are part of some minimal situation in $\{s: s \text{ contains at least one blue-eyed bear and } s \text{ contains at least one intelligent blue-eyed bear}\}$.

And (39) reduces to (40):

(40) $[[\text{(37)}]] = 1$ iff

most minimal situations in $\{s: s \text{ contains at least one blue-eyed bear}\}$ are part of some minimal situation in $\{s: s \text{ contains at least one intelligent blue-eyed bear}\}$.

We are now at the point where it is of crucial importance that we are talking about *minimal* situations. The minimal situations in $\{s: s \text{ contains at least one blue-eyed bear}\}$ each contain a single blue-eyed bear. The minimal situations in $\{s: s \text{ contains at least one intelligent blue-eyed bear}\}$ also each contain a single blue-eyed bear (an intelligent one). But if one situation that contains a single blue-eyed bear is part of another situation that contains a single blue-eyed bear, then the two situations must contain *the very same blue-eyed bear*. So we can reduce (40) still further. Since minimal situations in $\{s: s \text{ contains at least one blue-eyed bear}\}$ each contain a unique blue-eyed bear, any such situation is part of a minimal situation in $\{s: s \text{ contains at least one intelligent blue-eyed bear}\}$ iff it is part of a minimal situation in which *its own unique blue-eyed bear is intelligent*. And so:

(41) For any s' in $\{s: s \text{ contains at least one blue-eyed bear}\}$, call the unique blue-eyed bear in s' $U_{s'}$.

Then $[[\text{(37)}]] = 1$ iff

most minimal situations s' in $\{s: s \text{ contains at least one blue-eyed bear}\}$ are part of some minimal situation in $\{s: U_{s'} \text{ is intelligent in } s\}$.

A final point. On Kratzer's view of situations, the minimal situations in $\{s: s \text{ contains at least one blue-eyed bear}\}$ each contain a single blue-eyed bear *without any of its properties* (other than eye color), and nothing else, and there is exactly one such situation for every blue-eyed bear.⁸¹ If there is exactly one such situation for every blue-eyed bear -- if there are just as many minimal situations that contain at least one blue-eyed bear as there are blue-eyed bears themselves. -- then that leads us to (42):

(42) $[[[(37)]]] = 1$ iff
 most blue-eyed bears b are part of some minimal situation in
 $\{s: b \text{ is intelligent in } s\}$.

Although still with a little bit of hand waving, we can claim that this amounts to saying that $[[[(37)]]]$ is true iff most blue-eyed bears are intelligent. There: quantificational variability.

As should be clear from this discussion, minimal situations play a central role in the Tin Man's explanation of quantificational variability. In what we have just gone through, the fact that adverbial quantifiers range over minimal situations guarantees that there is a one-to-one correspondence between situations that the quantifier ranges over and blue-eyed bears. It thus accomplishes on its own something that, for me, the uniqueness presupposition of indefinites and the default assumption accomplish together. In fact, reference to minimal situations does even more than this. It not only guarantees that we consider situations that contain a *single* blue-eyed bear when we look at situations that the

⁸¹ Similarly, the minimal situations in $\{s: s \text{ contains at least one intelligent blue-eyed bear}\}$ each contain a single blue-eyed bear whose only property (other than eye color) is intelligence, and there is only one such situation for every intelligent blue-eyed bear. It is crucially assumed here that a situation that contains an individual without any of his properties is part of a situation that contains that individual together with properties of his, likewise that a situation that contains an individual together with any of his properties is part of a situation that contains that individual together with those properties and others.

quantifier ranges over, it also makes sure that we talk about the *same* blue-eyed bear when we look at situations in the quantifier's scope.⁸² This is what produces the effect of quantifying over individuals. Notice at the same time, however, that the success of this story depends on the idea that we are choosing a certain value for P_S -- a value with the property that every minimal P_S -situation contains a single blue-eyed bear. If P_S did not have this property, quantificational variability would not result. The system was designed with certain values of P_S in mind, and this is something that I will take advantage of in the coming discussion.

3.3. A chink

In this section, I will point out ways in which the predictions of the Tin Man differ from the predictions of my theory. I will then try to show that my predictions are right and the Tin Man's are wrong. I will be relying on the fact that, on the Tin Man theory as on mine, the restrictive argument of an adverbial quantifier is determined exclusively by the pragmatics. (This aspect of the Tin Man is shared by von Stechow 1994, 1996 but not (obviously) by de Swart 1995; so possibly the point I make here doesn't affect the latter.)

The essential point is this: the Tin Man theory and my theory make very different predictions about the way sentences with adverbial quantifiers and indefinites behave in context.

The basic difference is related to the fact that the two views place different conditions on what predicates of situations can serve as the first argument of the adverbial

⁸² Von Stechow 1994, 1996 calls this overcoming the problem of "requantification." The idea is that there is an existential quantifier in both the restrictor and the scope of the adverbial quantifier, and we want somehow to make sure that they pick out the same individual.

quantifier. On my view, a predicate of situations P can serve as the quantifier's restrictive argument *only if every situation of which P holds contains a unique I-individual*. The Tin Man imposes much weaker requirements. On the Tin Man view, in sentences where the Tin Man's Constraint applies, a predicate of situations P can serve as the quantifier's restrictive argument *only if every situation of which P holds contains at least one I-individual*. (And in sentences where the Tin Man's Constraint doesn't apply, the conditions are even weaker: any predicate of situations can serve as the quantifier's restrictive argument.)

At the same time, on both my view and the Tin Man view, the context can determine what predicate of situations serves as the quantifier's restrictive argument. This is because, on both views, the restrictive argument of the quantifier is anaphoric, and the context can provide a value for this anaphor. When the context makes a set of situations salient, it thereby makes the characteristic function of this set (a predicate of situations) available as an antecedent.; so, when the context makes a set of situations salient, the characteristic function of this set can serve as the quantifier's restrictive argument. Let's assume⁸³ that, when we have a contextually salient set of situations, the *only* predicate of situations that we can generate as a potential antecedent for anaphors is the characteristic function of this set. Then (with a little bit of hand waving) it's also true on both views that, *when* the domain of an adverbial quantifier is constrained by the context, that is *because* the quantifier's restrictive argument is the characteristic function of some contextually salient set of situations. The consequence is that my view claims that, in all cases where the domain of quantification is constrained by the context, *there is a contextually salient set*

⁸³ This could well be an oversimplification, but at least I think it is reasonable to claim that generating the characteristic function of a salient set as a potential, antecedent is quite automatic, and generating any other predicate would involve a lot of laborious additional processing (taking the mereological sum of the situations in the salient set, dividing it up into other situations, finding the characteristic function of that...)

of situations each of which contains a unique I-individual. While the Tin Man view, at its strongest (i.e. considering only sentences where the Tin Man's Constraint applies), claims that, if the domain of quantification is constrained by the context, *there is a contextually salient set of situations each of which contains at least one I-individual.*

So here is a concrete difference in prediction. My view says we can never find a case where the domain of the adverbial quantifier is constrained by the context and where the only contextually salient set of situations contains more than one I-individual. The Tin Man says we should be able to find one. We could stop here and try to see if there *are* any convincing cases of this kind -- cases where a sentence contains a single adverbial quantifier and an indefinite, where the domain of the adverbial quantifier is constrained by the context, and where we also have reason to believe that the only contextually salient set of situations contains situations with more than one I-individual.

I would rather not stop here. This might seem dirty and underhanded on my part, because on the basis of what I have just said my theory is definitely susceptible to attack. I have been systematically ignoring in this thesis the kinds of sentences that led people initially to the conclusion that indefinites are existential quantifiers, but one might imagine that just these kinds of sentences -- sentences where indefinites receive so-called existential readings -- could provide crucial evidence for the Tin Man over my theory. And in fact, one does find examples like (43). It is reasonable to think that *always* in (43) ranges over situations that last the duration of a single lecture, and that each such situation contains more than one audience member (though this might very likely change).

(43) I don't go to his lectures anymore. He always gets upset and throws something at a member of the audience.

I don't have much to say in my defense here; I think that it is wrong to consider these examples as examples that distinguish between the two theories, but I can't offer adequate justification for this. I would like to note that these examples are harder to come by than one might think.⁸⁴ (As I will remark at the end of the thesis, I think that on the right view of these sentences, either the indefinite receives a different interpretation altogether from the one that I am concerned with, or there is a *second* quantifier over situations that binds the situation argument of the indefinite determiner.) What I want to stress now is that we actually have more to go on in distinguishing the two views. This is because the Tin Man theory makes a *further* prediction about the meanings that sentences with adverbial quantifiers can have precisely in those cases where there are contextually salient situations that contain more than one I-individual. When we look at the right examples, we find that these meanings are *not* in general available, and this counts as evidence against the Tin Man.

Recall that, on the Tin Man theory, the indefinite is essentially just an existential quantifier. In a sentence like *A blue-eyed bear is usually intelligent*, the second argument of *usually* is a predicate of situations that holds of situations that contain *at least one*

⁸⁴ The property that the examples share is that (although it is understood that each situation that the quantifier ranges over contains at least one I-individual) there is no *explicit* mention of a set of I-individuals in the previous discourse. For instance, I think (43) contrasts with:

(i) My friends don't go to his lectures anymore. ?That is because he always gets upset and throws something at a friend of mine.

What one would say instead of *a friend of mine* here is *one of them*, or possibly *ONE friend of mine*, with *friend of mine* destressed. In general, in cases where a set of individuals of the relevant kind is mentioned in the prior discourse, one has to use *one* or *some* rather than the indefinite determiner, and to destress or pronominalize the nominal predicate that follows. The right explanation for this could have something to do with phonology: it might be that one is independently forced to destress the nominal predicate in these cases, and that *a* cannot appear before a destressed nominal predicate (perhaps because in all such cases something in the DP requires stress, and *a* cannot receive stress but *one* and *some* can). There are obvious connections to discussions in the literature of the Novelty Condition on the use of indefinites (Christophersen 1939, Heim 1982). There might also be a connection with facts about the use of *one* that I will mention at the very end of this thesis.

intelligent blue-eyed bear. Recall as well that what enables the Tin Man theory to account for quantificational variability is the special reference to minimal situations in the semantics of the adverbial quantifier. The sentence *A blue-eyed bear is usually intelligent* says that most *minimal* situations that satisfy the first argument of *usually* are part of a minimal situation that satisfies the first argument of *usually* and contains at least one intelligent blue-eyed bear. Even if the first argument of *usually* holds of situations that contain *more* than one blue-eyed bear, as long as the *minimal* situations among them contain a single blue-eyed bear⁸⁵, the sentence has the effect of quantifying over blue-eyed bears. Now, so far, we have only looked at a case where the minimal situations that satisfy the first argument of *usually* do in fact each contain a single I-individual. What I want to look at now is a case where they don't. In a case where they don't, the Tin Man predicts that the sentence will express a mere existential claim. For instance, if the minimal situations that satisfy the first argument of *usually* contain more than one blue-eyed bear each, the Tin Man predicts that the sentence *A blue-eyed bear is usually intelligent* expresses nothing more than that most of these situations contain at least one intelligent blue-eyed bear (or are parts of situations that do).

So here is a bigger difference in prediction. Take a sentence that contains an adverbial quantifier and an indefinite. Take a context that makes salient a set of situations some of whose minimal elements contain more than one I-individual. My view says that we cannot use this context to constrain the domain of the adverbial quantifier. The Tin Man view says not only that we can, but that, when we do, *the sentence expresses an existential claim*. I think that we can argue that the Tin Man's prediction is wrong. Moreover, it is not so hard to argue this, because I take it that, when the context makes a set of situations salient, these situations rarely if ever overlap. I will assume here that they

⁸⁵ And a different one for each situation.

never do. This means that *any* element of a contextually salient set of situations is a minimal element of the set -- so if a contextually salient set contains a situation with more than one I-individual, it also has a minimal element that contains more than one I-individual. (One might well question this assumption; I will address skeptics at the end of the discussion.)

For our examples, let's go back to sentences of the kind that we used in arguing against quantification over individuals. Consider first the sentence in (44a). On the Tin Man theory, the sentence in (44a) has the logical form in (44b). (I am assuming here that the Tin Man's Constraint applies, and thus that a TOP operator is present at logical form.)

(44) a. A lion was usually in excellent health.

b. usually P_S [λs [TOP[[a s] lion] be-in-excellent-health s]

The Tin Man predicts (44) to be appropriate if every situation that satisfies P_S contains at least one lion, and true if most minimal situations that satisfy P_S are part of some minimal situation that satisfies P_S and contains at least one healthy lion. If it happens to be the case that every situation that satisfies P_S is also a *minimal* situation that satisfies P_S , then the Tin Man predicts (44) to be true if most situations that satisfy P_S contain at least one healthy lion.

Now consider the context in (45). We are going to imagine evaluating (44) in this context.

(45) *Context (The Circus Vet):*

They brought me to the cages where they kept the wild animals. My task was to go up to each cage and examine the animals inside. If just one of them showed any sign of disease, they would have to give all of them a rest from training and send them away for more rigorous medical testing.

I went cage by cage, inspecting the animals. In each cage, there were three lions and three tigers.

Just as in the example that we considered at the beginning of the chapter, the context in (45) makes salient a set of occasions of inspection -- but unlike the example we considered earlier, each occasion of inspection here contains three lions rather than only one. Note that we have reason to believe that this set of occasions can be used to restrict the domain of an adverbial quantifier: (46) is a plausible continuation to the passage in (45), and we naturally understand (46) as saying that, *on most occasions of inspection*, the vet found a couple of panthers in addition to the lions and tigers.

(46) *Continuation*: There were usually a couple of panthers as well.

Importantly for the argument, I assume that each situation that the context makes salient corresponds to a single occasion of inspection, and includes all three lions in the cage under examination. No situation in this set contains another, so every situation in this set is a minimal element of the set.

What does the Tin Man predict about the use of (44) in the context of (45)? First of all, it predicts that the use of (44) is appropriate if the value that we assign to P_S is the characteristic function of the contextually salient set of situations. This is because every situation in the contextually salient set contains at least one lion. Second of all, it predicts that, if we give that value to P_S , (44) will express that, on most occasions of inspection, at

least one lion was in excellent health. Why? Again: The Tin Man says that (44) is true if most minimal situations that satisfy P_S are part of some minimal situation that satisfies P_S and contains at least one lion in excellent health. If P_S is the characteristic function of the contextually salient set of situations, then the set of situations that satisfy P_S is the contextually salient set, and every situation in this set is a minimal element of this set. So the Tin Man says that (44) is true if most situations in the contextually salient set are situations in the contextually salient set that contain a lion in excellent health. Or in other words that (44) is true if most situations in the contextually salient set contain at least one lion in excellent health.

But unfortunately for the Tin Man, I think that this is not our intuition. Imagine continuing the passage as in (47).

(47) *Continuation:* A lion was usually in excellent health. (The same, however, could not be said for the tigers.)

The Tin Man says that we would regard a continuation like the first sentence in (47) (= (44)) as appropriate and true even if under half of the lions that the vet saw were in excellent health -- as long as most cages contained at least one very healthy lion. But I think we definitely would not regard (47) as true if we knew that those were the facts. My impression is that, if we have to interpret (47) in the context of (45), we understand it as saying nothing less than that most of the lions that the vet saw were in excellent health.⁸⁶

⁸⁶ Presumably, to get this interpretation, we would sum the situations together into one, and then partition the resulting situation into situations of the required kind.

The general point that this makes is that, in cases where it has to, the Tin Man is unable to distinguish between salient sets of situations each of which contain a *single* I-individual and salient sets of situations each of which contain *at least one* I-individual. It predicts the following correlation. Suppose we can say that a sentence like *A lion was usually in excellent health* is true in a context where the salient situations contain a single lion and most of these situations contain a lion in excellent health. (The example I used to argue against quantification over individuals in 2.2 is an example like this.) Then we should also be able to say that the sentence is true in a context where the salient situations contain *more than one* lion and most of these situations contain a lion in excellent health. But there is no such correlation, and this is a strong point against the Tin Man.

We can make a similar point with our example involving Danny and the blue-eyed bears. On the Tin Man theory, the sentence in (48a) has the simplified logical form in (48b). (Again, I assume here that the Tin Man's Constraint applies, and thus that a TOP operator is present at logical form.)

- (48) a. Danny usually knew whether a blue-eyed bear was intelligent
 b. usually P_S [λs_1 Danny know-whether s_1 [λs_2 [TOP[a s_2 b-e-b]]
 be-intelligent s_2]]

The Tin Man predicts (48) to be appropriate if every situation that satisfies P_S contains at least one blue-eyed bear (and Danny). It predicts (48) to be true if most minimal P_S -situations are part of a minimal element of *the set of P_S -situations such that Danny knows in that situation whether at least one blue-eyed bear in the situation is intelligent*. Suppose it happens to be the case that every situation that satisfies P_S is also a

minimal situation that satisfies P_S . Then the Tin Man predicts (48) to be true if most situations that satisfy P_S are such that Danny knows in that situation whether at least one blue-eyed bear in the situation is intelligent. The Tin Man thus predicts that (48) makes quite a weak claim. The claim is much weaker than the claim that most blue-eyed bears that appeared in a P_S -situation were such that Danny knew whether they were intelligent. The claim is also weaker than the claim that, for most pairs of P_S -situations and blue-eyed bears that appeared in it, Danny knew in that situation whether that bear was intelligent.

Now, let's imagine an experiment that is slightly different from the one we were talking about at the beginning of the chapter. In this experiment, Danny is confronted with four blue-eyed bears at a time, though his actual task is still to say for each of these bears whether the bear is intelligent.

Now as everyone knows, getting a group of blue-eyed bears together can mean trouble. If none of them are very bright, they immediately get into a fight. Still, if there does happen to be an intelligent blue-eyed bear among them, the intelligent one generally gets the others to curb their disorderly tendencies, and manages to keep the group tolerably well behaved. What this means, of course, is that, when you are confronted with a group of blue-eyed bears, it is pretty easy to figure out whether *at least one of them* is intelligent. If the entire group is well behaved, then there has got to be an intelligent bear among them. On the other hand, if they are embarrassingly unruly, then it's a pretty good bet that none of them is intelligent. And Danny, who is accustomed to searching for much subtler evidence, is not going to ignore this information when he performs his task.

What actually happens is this. Danny sees ten groups of bears. Three are riotous,

the others are well behaved. As far as the riotous groups go, Danny immediately responds that not a single bear in the group is intelligent. He is correct for the most part: actually, one of the groups contains a bear that is intelligent but not such a great disciplinarian. As far as the intelligent groups go, Danny is at a loss. He is able to tell that at least *one* bear in the group is intelligent, and he tells the experimenters this at once. But he has no clue which bears are the intelligent ones, and, when pressed to respond about each bear in the group, his responses are random.

The set of situations that this scenario makes salient is the set of trials in the experimental task. But unlike the example we considered at the beginning of the chapter, each situation here contains four blue-eyed bears rather than only one: in each situation, Danny is exposed to a different *group* of bears. As I noted in my discussion of the earlier example, there is reason to believe that this set of situations can be used to restrict the domain of an adverbial quantifier. An experimenter could have written in his notebook

(49) Danny usually didn't want to give a response.

and thereby claimed that, most times that Danny was confronted with a group of bears, Danny didn't want to give a response.

In light of this scenario, consider the sentence that we started out with, the one in (50) (= (48)).

- (50) a. Danny usually knew whether a blue-eyed bear was intelligent
 b. usually P_S [λs_1 Danny know-whether s_1 [λs_2 [TOP[a s_2 b-e-b]
 be-intelligent s_2]]]

The Tin Man predicts (50) to be appropriate in the context of this scenario: we should be able to assign to P_S the characteristic function of the contextually salient set of situations, and each situation in this set contains at least one blue-eyed bear (and Danny). The Tin Man also predicts (50) to be *true*: every situation in the contextually salient set of situations is a minimal element of the set, and it is indeed true that, for most situations in this set, Danny knew in that situation whether *at least one* blue-eyed bear in the situation was intelligent. So according to the Tin Man, if the facts of the experiment are as I set them out, the experimenter should be able to report (50) without being misleading.⁸⁷ Again, however, I take it that this is not our intuition. Our intuition is that we do *not* regard a sentence like (50) as true on a scenario like the one that I just presented. (50) seems ill suited to make any claim about the experiment, and my impression is that, if we have to interpret (50) as making some claim about the experiment, we understand it as saying that, for most of the bears that Danny was confronted with, he knew whether they were intelligent. (And this latter claim, of course, is false.)

To summarize: Again, we see that the Tin Man is unable to distinguish between salient sets of situations each of which contain a *single* I-individual and salient sets of situations each of which contain *at least one* I-individual. It predicts the following correlation. Suppose we say that a sentence like *Danny usually knew whether a blue-eyed bear was intelligent* is true in a context where the salient situations each contain a single blue-eyed bear and, for most of these situations, Danny knows whether the blue-eyed bear in the situation is intelligent. Then we should also be able to say that the sentence

⁸⁷ Or at any rate without being any *more* misleading or confusing than he would be by reporting (50) on a Scenario like Scenario One in Section 4.2.2.2. (That is, on a scenario where Danny sees a single bear each time and it turns out that, on most occasions where he is confronted with a bear, he knows whether that bear is intelligent.)

is true in a context where the salient situations each contain *more than one blue-eyed bear* and, for most of these situations, Danny knows whether *at least one* blue-eyed bear in the situation is intelligent. But there is no correlation.

3.3.1. *Did I make an assumption I shouldn't have made?*

A final remark (as promised). In the examples that I used in this section, I assumed that the set of situations that the context made salient had the property that no situation in the set included another. For example, I assumed that, in the case of the circus vet, each situation in the contextually salient set corresponded to a single occasion of inspection and contained no fewer than three lions. In the case of Danny and the bears, I assumed that each situation in the contextually salient set corresponded to a single trial in the experiment and contained no fewer than three bears. These were crucial assumptions in arguing against the Tin Man, because I concerned myself with what the Tin Man's predictions would be if each situation in the contextually salient set were itself a minimal situation in the set. But was it fair to the Tin Man to make these assumptions?

The natural alternative is that the contextually salient set of situations in the cases I considered consists not only of the situations that I imagined to be there but also of *every situation included in these situations*. It seems to me that this alternative is at least as unpleasant for the Tin Man. This is again because adverbial quantifiers range over minimal elements of a set. If the context makes salient a set of situations *together with all of their parts*, then the minimal elements in the contextually salient set are mere points in space or time or something like that, and of infinite number. It would be very hard to make a case that *usually* ever quantifies over things like these. Notice also that, if the context makes salient a set of situations together with all of their parts, then the Tin Man's Constraint is

nothing but trouble. As long as any situation in the context contains a portion of space or time that does not include an I-individual, we will *never* be able to get from this set to a predicate of situations that satisfies the Tin Man's Constraint.⁸⁸ The Tin Man's Constraint is important in the Tin Man's explanation of quantificational variability: it is there to insure that there are just as many situations in the domain of quantification as there are I-individuals. If we have to give it up in all cases where the context makes a set of situations salient, then in all such cases where a sentence with an adverbial quantifier and an indefinite exhibits quantificational variability, we are going to have to look for another explanation for how quantificational variability arises.

It seems to me that the very least that the Tin Man would need to do to make this kind of alternative work is a stipulation: at logical form, adverbial quantifiers take as their first argument a predicate of situations that holds only of situations that contain at least one I-individual. But that's just what it is, a stipulation.⁸⁹

3.4. Flesh and blood alternatives

The alternative views that the Tin Man is supposed to represent (von Stechow 1994, 1996, de Swart 1995) might actually fare worse than the Tin Man in a couple of respects. Here I will briefly outline how.

First, they do not assume that indefinite determiners select for a situation argument. Rather, they assume simply that indefinite determiners are existential quantifiers. To the

⁸⁸ And, even if the situations in the context each contain nothing *more* than a single I-individual, presumably there will also be situations in the context that contain *parts* of I-individuals. So here too we would not be able to get from the contextually salient set of situations to a predicate that satisfies the Tin Man's Constraint.

extent that the semantics and selectional properties of *a* is identical to those of determiners like *some* or *at least one*, it poses the question of why *a* gives rise to quantificational variability but these other determiners with existential force do not. Why are sentences like (51) unable to express that most blue-eyed bears are intelligent?

- (51) a. Some blue-eyed bear is usually intelligent.
b. At least one blue-eyed bear is usually intelligent.

Von Stechow 1994, 1996 acknowledges this problem, and naturally suggests that the two kinds of determiners should not be treated as identical -- one way of reading his suggestion is that selectional properties of the two kinds of determiners are different, and (in contrast to the Tin Man) *some* and *at least one* select for something like a situation argument.⁹⁰

What would the Tin Man say about *some* and *at least one*? Though no particular story follows from anything I have said about the Tin Man so far, he could take advantage of the selectional distinction between *some/at least one* and *a* in a number of ways. Since *some* and *at least one* don't select for a situation argument, something special is needed in order to get *some/ at least one blue-eyed bear* to encode a dependency on the quantifier. The brute force solution would be to say that there is an operator that we can attach to *blue-eyed bear* that has the following property: given a situation and a nominal predicate, it gives you back the nominal predicate but enforces a presupposition that the situation contains more than one individual that satisfies the nominal predicate. There are undoubtedly more insightful solutions as well.

⁸⁹ Note also that, if we made this stipulation, the only role that minimal situations would play in deriving quantificational variability would be to insure that every situation in the domain of quantification contained a different I-individual.

⁹⁰ He suggests (1996, p. 32) that "'strong' indefinites are inherently partitive and require that the situation contains all relevant individuals satisfying the restriction of the indefinite...[A sentence like (51)] thus must quantify over largish situations, each of which contains all relevant bears." One way of taking this

Also, it seems to me that there are problems with how existing theories attempt to achieve the Tin Man's Constraint. It is not clear to me from what it follows on de Swart's 1995 analysis. What von Stechow's 1994 proposal comes down to is the suggestion that quantificational variability sentences require there to be a question in the discourse that asks what property at least one blue-eyed bear has. (The idea is essentially that from this question one can then obtain a set of situations that each contain at least one blue-eyed bear, and this set -- or more precisely its characteristic function -- serves as the quantifier's first argument. Questions are sets of propositions, so we obtain this set by taking the union of those sets of situations that are propositions in the denotation of the question -- or more precisely, whose characteristic functions are propositions in the denotation of the question.) The appeal of von Stechow's 1994 proposal lies in part in its connection to current views of focus (Rooth 1992), under which focus introduces an anaphor whose antecedent is a question. But the notion that quantificational variability should be licensed by questions that ask what property *at least one blue-eyed bear* has is at the very least counterintuitive.

is that *some* and *at least one* select for a situation argument, and presuppose that the situation that they select for is large enough to contain all the individuals that satisfy the first predicate that they select for.

Chapter 5.

Final Remarks.

In the brief space of a page or two I will try to remark on the promise and the pitfalls of the analysis of indefinites that I have just proposed. I am sorry that I cannot do these issues justice in the version of the thesis that I am filing.

1. Specific Indefinites

The promise is that it seems to offer a direction for the analysis of specific indefinites.

Recall the problem that specific indefinites pose for the Russellian view that indefinites are existential quantifiers: unlike other natural language quantifiers, these quantifiers would appear to take scope outside their clause. An example of a case where we would be forced to say that the existential takes unexpectedly wide scope is the italicized sentence in (1a), when this sentence is taken as consistent with the scenario in (1b). If the indefinite contributes an existential quantifier, the quantifier must take scope over the universal quantifier, and thus outside the relative clause.

- (1) a. That student is crazy: before coming to MIT, *he e-mailed everyone who had ever studied with a professor of mine.*
- b. Scenario: only one among my professors is such that the relevant student e-mailed all the students and ex-students of that professor.

Note, however, that this scenario is potentially consistent with a use of an indefinite determiner that has the semantics I have given to the indefinite determiner. Informally speaking, on the view where the determiner has the lexical entry that I have proposed, (1a) should say: there is a situation temporally prior to the speech situation such that for every (ex-)student of *the unique professor of mine in s*, the student in question e-mailed that (ex-)student for the duration of some part of that prior situation. In part, whether this analysis is tenable depends on how the situation argument of the indefinite determiner is interpreted. But whether it is a variable bound by the lambda abstractor that is inserted at the root node (and therefore identified with the utterance situation), or a variable bound by the lambda abstractor that heralds the second argument of tense (and therefore identified with a situation in the past), or whether it is an anaphor whose antecedent is provided by the context, the sentence will be predicted to be consistent with a scenario where the nuisance's concern is with one professor only.

Now, there is a large literature on specific indefinites to reckon with. It is worth noting, though, that recent accounts of specific indefinites have argued that indefinites are individual-denoting expressions composed of a predicate and a function from predicates to individuals. (See for instance Reinhart 1995.) The similarity with what I have just proposed is intriguing.⁹¹

2. Indefinites and Definites

⁹¹ There is a puzzle to be dealt with. The nominal predicates in specific indefinites easily permit *de re* readings, but as we have seen in Section 2.3 of Chapter 3, the nominal predicates of quantificationally variable indefinites do not. I do not think that this means that the two deserve different lexical entries. As I hinted in that section, I think there is a solution to the problem. It has to do with the presence of an adverbial quantifier in constructions that exhibit quantificational variability: adverbial quantifiers must quantify over parts of the next highest quantifier over situations, and in the relevant cases, the next highest such quantifier is a modal.

The important challenge that my proposal has to face is this. If indefinites impose a uniqueness requirement, how do they differ from definites?

Indefinite determiners, I have argued, pick out the unique individual in a situation that has a certain property. But definite descriptions, too, are supposed to carry presuppositions of existence and uniqueness. Moreover, as we have already seen in Ch.3, as well as in Ch.4, Sec. 2.5, ex. (25), and as (2) shows, nothing prevents a definite description from including a dependency on a quantifier. If we think of a proposition of the form *The P Q* as predicating Q of some individual, we find on embedding this proposition that individuals asserted to have property Q may covary with items that are quantified over:

- (2) a. In every class, the brightest student thinks he is God.
- b. In most Mediterranean countries, the climate is pleasant.

One might therefore think that, in sentences involving adverbial quantification, indefinite descriptions and definite descriptions would be interchangeable.

But QV indefinite descriptions and definite descriptions are not interchangeable. Sometimes, definite descriptions are unable to substitute for indefinites. For example, unlike (3a), (3b) does not seem appropriate to describe a generalization about barbers (to accomplish this effect, one needs to overtly restrict the situations quantified over, as in (3c)).

- (3) a. A barber is usually bald.
- b. # The barber is usually bald.

(c. When you find a barber, the barber is usually bald.)

And sometimes indefinites are unable to perform the function of situation-dependent definite descriptions. (3a) seems quite awkward compared to (3b):

- (3) a ?? A brightest star is usually the(/a) star closest to the horizon.
b. The brightest star is usually the star closest to the horizon.

Moreover, given my speculations about specific indefinites, it is unclear why (4a) appears to convey something different from what (4b) conveys. Since there is no adverbial quantification in (4), one might imagine, for example, that the situation argument of the indefinite determiner could be bound by the lambda abstract attached to the root node. Why can't (4a) assert that the moon -- i.e. the unique moon that is located in the utterance situation, or something like that -- is unusually bright?

- (4) a. # A moon is unusually bright.
b. The moon is unusually bright.

One can justifiably be skeptical of my theory until I say how indefinites differ from definites in their meaning or in their use. I don't have an answer for this now. I do have a direction in which to search for a solution for one half of the problem: the problem why it is that sometimes we can use an indefinite but not a definite description. I have argued that indefinite determiners select for a situation argument; I don't know of a reason to think that definite determiners do. What this means is that definite determiners might not introduce a dependency on situations as effortlessly as indefinite determiners do. It could be that definite determiners are simply functions from predicates to individuals, functions that yield the unique individual that satisfies the predicate. If this is so, then those definite

descriptions that contain dependencies on situations will be complex: either the predicate that apparently serves as the determiner's sole argument must contain a dependency on situations, or this predicate must be conjoined with an *implicit* predicate of individuals that is composed of a situation and a function from situations to predicates of individuals. If this latter function is an anaphor, it could well turn out that, in those cases where we can use indefinites but not definites, the context simply doesn't make salient any function from situations to predicates of individuals. Of course, this is speculation.

How about those cases where we seem to be able to use indefinites but not definites? Here I am at a loss. I would like to make the observation that this is not a *new* problem. It has been observed before that it is inappropriate to use an indefinite in cases

where it is known that the indefinite's nominal predicate holds of only one individual.⁹²

There is thus a contrast between the two sentences in (5):

- (5) a. There's a colleague of yours on the phone.
b. # There's a father of yours on the phone.

But for the moment I admit that the skeptics have something to hold on to.

3. A Last Word

I will have succeeded in my goal if in these hundred and sixty odd pages I have managed to convince you that, by assuming that indefinites carry a uniqueness presupposition, we illuminate the phenomenon of quantificational variability in a way that other theories do not. At the same time, I have pretty systematically overlooked those indefinites that most clearly appear to contribute existential claims. This is not necessarily a problem: the logical forms that I have been assuming are full of existential quantifiers over situations, quantifiers that could bind the situation argument of the indefinite determiner and thereby potentially explain the intuition that some indefinites are tied to existential assertions. (In particular, note that I have assumed throughout that there is an existential quantifier over situations inserted at logical form at the VP level.) But a serious investigation of these will be necessary to rid our house of ghosts.

⁹² See Heim 1991 for speculations that the effect has a pragmatic basis; see Löbner 1985 for a germane theory of definite descriptions.

The people of Travnik made extensive enquiries, bribing informers and buying them drinks, to find out anything they could about the man who was going to be the new vizier. It sometimes happened that they would pay allegedly well-informed people, only to realise later that they were a pack of liars and cheats. But even then they did not think that their money was entirely wasted, for sometimes what *can* be invented about a person will tell you quite a lot about him. Wise and experienced as they were, the people of Travnik were often able to extract from these lies a grain of truth which even the liar had not known lay amongst them. If nothing else, the lie served them as a starting point which they could easily discard when they had discovered the truth.

Ivo Andric
The Story of the Vizier's Elephant

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