Quantificational Variability Effects with Plural Definites: Quantification over Individuals or Situations?*

Cornelia Endriss & Stefan Hinterwimmer

University of Potsdam; Humboldt University Berlin

In this paper we compare the behaviour of adverbs of frequency (de Swart 1993) like *usually* with the behaviour of adverbs of quantity like *for the most part* in sentences that contain plural definites. We show that sentences containing the former type of Q-adverb evidence that *Quantificational Variability Effects* (Berman 1991) come about as an indirect effect of quantification over situations: in order for quantificational variability readings to arise, these sentences have to obey two newly observed constraints that clearly set them apart from sentences containing corresponding quantificational DPs, and that can plausibly be explained under the assumption that quantification over (the atomic parts of) complex situations is involved. Concerning sentences with the latter type of Q-adverb, on the other hand, such evidence is lacking: with respect to the constraints just mentioned, they behave like sentences that contain corresponding quantificational DPs. We take this as evidence that Q-adverbs like *for the most part* do not quantify over the atomic parts of sum eventualities in the cases under discussion (as claimed by Nakanishi and Romero (2004)), but rather over the atomic parts of the respective sum individuals.

Adverbial Quantification, Situations, Tense Semantics, Adverbs of Frequency, Adverbs of Quantity

1 Introduction

Consider (1a) below, which has a prominent reading that can be paraphrased as in (1b):

---

* Parts of this paper have been presented at *Sinn und Bedeutung 9* in Nijmegen and at the *Semantics Circle* at ZAS, Berlin. We would like to thank the audiences of both events as well as Sigrid Beck, Andreas Haida, Christian Krause, Manfred Krifka, Peter Staudacher, and Malte Zimmermann for discussion, valuable comments, and technical help.

(1) a. The people who lectured at the conference last summer were usually smart.

b. Most (of the) people who lectured at the conference last summer were smart.

Also the sentence in (2a) has a prominent reading that can be paraphrased as in (2b).

(2) a. For the most part, the lions that Peter saw during the safari had a mane.

b. Most (of the) lions that Peter saw during the safari had a mane.

The phenomenon that adverbially quantified sentences have readings that can be paraphrased by sentences where the respective Q-adverb has been replaced by a quantificational DP of corresponding quantificational force is generally referred to as *Quantificational Variability Effect* (QVE) (since Berman 1991). It is usually discussed in connection with adverbially quantified sentences that contain singular indefinites (3a) or bare plurals (3c) below, the QV-readings of which are given in (3b, d), respectively.

(3) a. A lion is usually brave.

b. *Most lions are brave.*

c. Lions are often brave.

d. *Many lions are brave.*

Notice, though, that the Q-adverb *for the most part* needs to be combined with a bare plural (or a plural definite, as seen above), as evidenced by the contrast between (4a) and (4c): while the most prominent reading of (4a) is the QV-reading given in (4b), (4c) lacks such a reading and is deviant if *be smart* receives its standard interpretation as an individual level predicate (henceforth: *i-level predicate*) and is not re-interpreted as a stage level predicate (henceforth: *s-level predicate*) meaning *to behave in a smart way* (see Kratzer 1995 and Chierchia 1995a on the difference between the two types of predicates as well as on the possibility of re-interpreting i-level predicates as s-level predicates).

(4) a. For the most part, lions are smart.

b. *Most lions are smart.*

c. * For the most part, a lion is smart.

Concerning the QV-readings of sentences like the ones in (3) above, two different types of explanation have been offered in the literature. The first one treats QVEs as the direct result of a quantification over individuals that comes about in the following way: Q-adverbs are unselective binders, capable of binding free variables of any type in their scope. Furthermore, singular indefinites as well as bare plurals are analyzed as open expressions that introduce free variables the values of which have to satisfy the respective NP-predicate (see Kamp 1981, Heim 1982, Diesing 1992 and Kratzer 1995 for details).

The second type of explanation treats QVEs as the indirect result of a quantification over (minimal) situations/events that each contain exactly one individual satisfying the respective NP-predicate. The latter is a consequence of the respective DPs – which are interpreted as generalized quantifiers with existential force – being interpreted in the restrictor of the respective Q-adverb. Furthermore, as the (minimal) situations/events quantified over are exclusively individuated via the (value of the) respective DP, the individual variable bound by the existential quantifier has to vary with the situation/event variable bound by the Q-adverb. This explains the "illusion" that the respective Q-adverb quantifies over individuals directly (see Berman 1987, de Swart 1993, von Fintel 1994, 2004 and Herburger 2000 for details).

Concerning sentences with plural definites, on the other hand, the only discussions of QVEs we are aware of are found in Graff (2001, to appear) and Nakanishi and Romero (2004). But neither of them deal with sentences like (1a): Graff is primarily concerned with sentences like (5a) below, where the definite DP is modified by a possessive PP that contains an indefinite DP. Nakanishi & Romero, on the other hand, exclusively deal with sentences like (5c), which contain the Q-adverb *for the most part*.

(5) a. The parents of a toddler usually have little time for relaxation.
(Graff 2006: ex. (44a)).

b. *Most parents of a toddler have little time for relaxation.*

c. For the most part, the students admire Mary
(Nakanishi and Romero 2004: ex. (31a)).

d. *Most (of the) students admire Mary.*

Graff (2001, to appear) explains the fact that a sentence like (5a) has a prominent reading that paraphrasable as in (5b) as follows: the definite article introduces a maximality condition. It turns the (characteristic function of the) set denoted by the respective NP-predicate into the (characteristic function of the) singleton that contains "the *highest-ranked* member of the extension of the common noun" (Graff 2001: 20). In line with Sharvy (1980) and Link (1983) she takes singular nouns to denote sets of atoms, and plural nouns to denote sets of sums of atoms. So in case the definite article combines with a plural noun, it returns the singleton set consisting of the maximal sum in the original set.

Concerning singular nouns, on the other hand, the definite article can only be combined with such a noun if it denotes a singleton set in the first place, as there is no natural ordering available for the members of a set of atoms.

The only difference between the approach of Sharvy (1980) and Link (1983), on the one hand, and the approach of Graff (2001, 2006), on the other, is that the former assume that the definite article turns a set into an individual, while the latter assumes that the definite article turns a set into a singleton set. Furthermore, Graff (2001, 2006) assumes that definites (as well as singular indefinites and bare plurals) in argument position function as the first argument (i.e. the restrictor) of either an overt Q-adverb (if present) or of a covert existential quantifier or generic operator. Accordingly, a sentence like (5a) can be interpreted as shown in (6) below if the definite DP functions as the first argument of the Q-adverb *usually*.

(6) Most x [∃y[y is a toddler ∧ x are the parents of y]] [x have little time for relaxation]

Note that the QV-reading in this case is a mere consequence of the fact that the maximality condition associated with the definite article is relativized with respect to the individuals introduced by the indefinite *a toddler*: for each such individual *y* there is a different sum individual that uniquely satisfies the predicate *parents of y*. As no element which may induce such a relativization is present in the case of (1a), this account is not general enough to cover the cases discussed in this paper.

The account of Nakanishi & Romero (2004) will be discussed in detail below. For the moment, suffice it to say that according to these authors the QV-reading of a sentence like (5c) comes about in a way that can roughly be described as follows: the Q-adverb *for the most part* quantifies over the atomic parts of a sum eventuality which is defined on the basis of the fact that the agent of this sum eventuality is the maximal sum individual denoted by the definite DP *the students*. The sentence is thus true if most parts of this sum eventuality are also parts of an eventuality of admiring Mary. This reading corresponds to the QV-reading paraphrased by (5d) if one furthermore assumes that the atomic parts of the restrictor eventuality correspond to the atomic parts of the sum individual denoted by *the boys*.

Somewhat ironically, we will argue below that while there are indeed good reasons to adopt a similar approach in order to account for the QV-readings of sentences like (1a), which contain frequency adverbs like *usually*, there is evidence that the QV-reading of a sentence like (5c) does not come about in the indirect way assumed by Nakanishi & Romero (2004), but rather follows from the fact that the Q-adverb *for the most part* quantifies over the atomic parts of the sum individual denoted by *the students*. Our argument is based on contrasts like the ones in (7) – (9):

(7) a. The people who lectured at the conference last summer were usually smart.

b. Most (of the) people who lectured at the conference last summer were smart.

c. For the most part, the people who lectured at the conference last summer were smart.

(8) a. * The people who lectured at the conference last summer are usually smart.

b. Most (of the) people who lectured at the conference last summer are smart.

c. For the most part, the people who lectured at the conference last summer are smart.

(9) a. * The people who listened to Peter's talk at the conference last summer were usually smart.

b. Most (of the) people who listened to Peter's talk at the conference last summer were smart.

c. For the most part, the people who listened to Peter's talk at the conference last summer were smart.

Consider the contrast between (7a) and (8a) first: (7a), where the tense of the matrix verb and the tense of the relative clause verb agree, is grammatical, and receives a QV-reading. (8a) on the other hand, where the relative clause verb is marked for past tense, while the matrix verb is marked for present tense, does not have such a reading. It only has a reading according to which the sentence is true if everyone among a certain plurality of people that have the property of having lectured at the conference last summer is smart in most salient situations. The sentence is therefore odd if the i-level predicate *be smart* is not re-interpreted as an s-level predicate meaning *to behave in a smart way*.

The crucial point to note is that the same lack of agreement between the respective tense markings does not seem to matter if the Q-adverb *usually* is replaced by the determiner quantifier *most* or the Q-adverb *for the most part*: (8b, c) are both just as acceptable as (7b, c). A plausible explanation for this difference relies on the assumption that the domains of quantification differ in the respective cases: while this domain consists of eventualities/situations in the case of (7a) and (8a), it consists of individuals in the case of (7b, c) and (8b, c). Based on this assumption, we will argue below that quantification over eventualities/situations must obey a constraint called the *tense agreement constraint*, which does not hold for quantification over individuals. This constraint is violated in the case of (8a).

Next, consider (9a): the sentence is odd in spite of the fact that the tenses of the matrix verb and the relative clause verb agree. The only difference between (7a) and (9a) concerns the internal constitution of the eventualities introduced by the respective relative clauses: in the case of (7a) it is plausible to assume that this eventuality consists of parts that are temporally distributed, as there is no reason to assume that all lectures given at a conference take place at the same time. In the case of (9a), on the other hand, it is almost inevitable to assume that the relative clause eventuality consists of parts that coincide temporally (or at least overlap to a very high degree), as one normally listens to a talk from start to finish. It seems that this difference in the internal constitution of the respective eventualities is responsible for the fact that (9a) in contrast to (7a) does not get a QV-reading. We refer to this constraint on the internal constitution of the eventualities introduced by the respective relative clauses as the *coincidence constraint*.

Again, we take the fact that both (9b) and (9c) are acceptable to constitute evidence in favor of our assumption that the respective quantificational domains differ. Furthermore, we will show below that the oddity of (9a) is not an isolated fact, but fits into a general pattern that can be explained by assuming that quantification over situations/events is constrained in a way that does not hold for quantification over individuals.

The paper is structured as follows. In section 2 we summarize the results of Endriss and Hinterwimmer (to appear), which discusses the conditions under which adverbially quantified sentences with singular indefinites get QV-readings. As we will see, lack of tense agreement between relative clause verbs and matrix verbs also leads to unacceptability in those sentences. In order to account for this fact, we introduced the *tense agreement constraint* referred to above.

In section 3 we discuss a prima facie plausible way of accounting for QVEs in sentences with plural definites under the assumption that Q-adverbs solely quantify over situations/events. While this account works well in many cases, we show that it does not apply correctly to sentences such as (1a).

In section 4 we discuss Nakanishi & Romero's (2004) analysis of QVEs in sentences with the Q-adverb *for the most part*, and in section 5 we show how a similar analysis can be combined with the results of section 2 in order to account for the *tense agreement constraint* exemplified by (8a). In section 6 we discuss these results in light of the *coincidence constraint* in order to account for the oddity of sentences like (9a).

In section 7 we critically evaluate the original motivation for Nakanishi & Romero's (2004) assumption that *for the most part* quantifies over the atomic parts of sum eventualities, and sketch an alternative account that treats *for the most part* as a quantifier over the atomic parts of sum individuals in the cases under discussion. Section 8 summarizes the main results of this paper.

2 Tense Agreement with Q-adverbs and Singular Indefinites

2.1 Data

In this section we discuss the conditions under which adverbially quantified sentences with singular indefinites get QV-readings and introduce the *tense agreement constraint*, which is also in effect in the case of adverbially quantified sentences with plural definites, and which we will return to in section 5. Note that we assume the respective indefinite DPs to be de-accented in the examples discussed below, while the main accent of the clause (which is indicated by capital letters) is on the most deeply embedded VP-internal element. This has the consequence that the indefinite DP is interpreted as non-focal, while the rest of the clause is interpreted as focal (see Selkirk 1995 for details regarding the relation of accent placement and focus interpretation).

This is important because it is well known that the arguments of Q-adverbs are determined on the basis of information structure – in contrast to the arguments of determiner-quantifiers, which are provided by the syntax. Glossing over some differences, most approaches to adverbial quantification agree on a mapping algorithm that can be informally described as follows (and that we will also assume for the time being; but more on this in sections 2.3 below): the first argument (the restrictor) of a Q-adverb is the denotation of the non-focal or topical part of the clause containing it, while the second argument (the nucleus) is the denotation of the whole clause minus the Q-adverb (see Rooth 1985, 1995, Chierchia 1995a, Krifka 1995, 2001, Partee 1995 and Herburger 2000 for details; cf. von Fintel 1994, 2004 and Beaver and Clark 2003 for a slightly different approach). Thus, in order to be mapped onto the restrictor of a Q-adverb, a DP needs to be interpreted as non-focal or even topical (the difference does not matter for our present purposes).

With this in mind, consider the contrast between (10a) and (10c):

(10) a. A car that was bought in the eighties was usually BLUE.

b. Most cars that were bought in the eighties were BLUE.

c. ?? A car that was bought in the eighties is usually BLUE.

Whereas (10a) is acceptable and receives an interpretation that can be paraphrased as in (10b), (10c) can only be interpreted as saying that there is a specific car such that this car is blue in most relevant situations. As it is very implausible to assume (at least in the absence of a special context) that cars change their color so often that the periods of them having a certain color can be quantified over, (10c) is odd.

The contrast between (10a) and (10c) is plausibly due to the fact that in the former case the tense marking of the matrix verb agrees with the tense marking of the relative clause verb, while in the latter case the tense marking differs. Note, however, that such an effect is entirely missing in sentences that contain quantificational DPs modified by relative clauses: (11) is just as acceptable as (10b), the only difference between the two sentences being that (10b) in contrast to (11) implicates that the cars quantified over do not exist anymore at the time of utterance (at least in their majority).

(11) Most cars that were bought in the eighties are BLUE.

2.2 Basic assumptions

In Endriss and Hinterwimmer (to appear; see also Hinterwimmer 2005 for more details) we argue that unselective binding approaches are unable to account for the contrast between quantificational determiners and Q-adverbs with respect to tense agreement. This is due to the fact that those approaches do not assume a relevant difference between a sentence like (10c) and a sentence like (11) at the level of semantic interpretation: both receive the (simplified) representation in (12).

(12) Most x [car(x) $\wedge$ was_bought_in_80s(x)] [is_blue(x)]

On the other hand, if one assumes that Q-adverbs can only quantify over situations or eventualities, the two sentences are interpreted differently: While (11) is represented as in (13a), (10c) receives a representation like the one given in (13b) in simplified form (cf. de Swart 1993, von Fintel 1994 and Herburger

2000)[1]. Note that we take the situation variables quantified over to be introduced by the respective verbal elements (more on this below). Furthermore, we assume a simplified tense semantics that assigns past and present tense markings the interpretations in (14).

(13) a. $\text{Most } x\ [\text{car}(x) \wedge \exists s'[\text{is\_bought}(x, s') \wedge \tau(s') < t_0 \wedge \text{in\_80s}(s')]]$
$[\exists s.\ \text{blue}(x, s) \wedge t_0 \subseteq \tau(s)]$

b. $\text{Most } s\ [\exists x.\ \text{car}(x) \wedge \exists s'[\text{is\_bought}(x, s') \wedge \tau(s') < t_0 \wedge \text{in\_80s}(s')] \wedge \text{in}(x, s)]$
$[\exists x.\ \text{car}(x) \wedge \exists s'[\text{is\_bought}(x, s') \wedge \tau(s') < t_0 \wedge \text{in\_80s}(s')] \wedge \text{blue}(x, s) \wedge t_0 \subseteq \tau(s)]$

(14) a. $[[\text{present tense}]] = \lambda P_{<s,t>}\ \lambda s.\ P(s) \wedge t_0 \subseteq \tau(s)$

b. $[[\text{past tense}]] = \lambda P_{<s,t>}\ \lambda s.\ P(s) \wedge \tau(s) < t_0$,

where t_0 is the time of utterance and $\tau(s)$ is the temporal trace of *s*, i.e. the temporal location of the situation *s* (see Ogihara 1998, which is based on Krifka 1989, 1992).

While the semantic representations of the two sentences obviously differ, there is nothing wrong with (13b) as it stands: according to (13b), (10c) is true if most (minimal) situations *s* containing a car that was bought in the eighties are also (minimal) situations *s* such that this car is blue in *s* and such that *s* is located at an interval that contains the time of utterance. These truth conditions are perfectly coherent. Yet, (10c) is judged as odd.

[1] Note that we have suppressed the minimality condition that would have to be added in order to avoid the so-called “requantification problem” (von Fintel 1994, see also Krifka 2001 for discussion)): it has to be assured that the variable bound by the existential quantifier in the nucleus is resolved to the same individual as the variable bound by the existential quantifier in the restrictor. This is guaranteed if Q-adverbs are only allowed to quantify over situations that are minimal in the sense that they do not have parts that also satisfy the respective situation predicate

2.3 The interval resolution strategy

Endriss and Hinterwimmer (to appear) assume that the unacceptability of sentences like (10c) can be explained as follows. We follow von Fintel (1994), Stanley (2000), and Marti (2003) in their assumptions that quantifiers – i.e. quantificational determiners as well as Q-adverbs – come with a covert domain restriction in the form of a free variable *C* ranging over predicates. This variable is added conjunctively to the overtly given predicate that functions as the first argument of the respective quantifier. Furthermore, as situations/eventualities need to be located in time (cf. Lenci and Bertinetto 1999), we assume that the *C*-variable introduced in the restriction of Q-adverbs is resolved to the situation predicate in (15).

(15) $\lambda s.\ \tau(s) \subseteq i_s$,
where i_s is a time interval.

Now, according to our assumptions so far, (10a) (which is repeated as (16a) below) is initially represented as given in (16b) below:

(16) a. A car that was bought in the eighties was usually BLUE.

b. $$\text{Most } s\ [\exists x.\ \text{car}(x) \wedge \exists s'[\text{is\_bought}(x, s') \wedge \tau(s') < t_0 \wedge \text{in\_80s}(s')] \wedge \text{in}(x, s) \wedge \tau(s) \subseteq i_s]$$
$$[\exists x.\ \text{car}(x) \wedge \exists s'[\text{is\_bought}(x, s') \wedge \tau(s') < t_0 \wedge \text{in\_80s}(s')] \wedge \text{blue}(x, s) \wedge \tau(s) < t_0]$$

The next step consists in finding a value to which the free interval variable i_s can be resolved. We assume that this value is determined according to a pragmatic strategy we dubbed the *interval resolution strategy (IRS)*, which is given in (17).

(17) 1. Take direct, overt information, where intervals denoted by temporal adverbs modifying the matrix verb count as *direct, overt information*.

2. If not available: take the most specific indirect information originating from the same domain, where the restrictor and the nucleus of a Q-adverb count as domains, respectively.

3. If not available: take either indirect information originating from the other domain, or the default interval t_{world}, which denotes the whole time axis.

The rationale behind this strategy is the general principle that local information is preferred to non-local information. In the case of (16a), step 1. is not applicable, as there is no temporal adverb that applies to the situation variable introduced by the matrix verb (although there is of course one that applies to the situation variable introduced by relative clause verb – namely *the eighties*). On the other hand, the relative clause introduces a salient situation within the same domain (i.e. the restrictor): the buying situation *s´*. Therefore, step 2. applies, and i_s is resolved to the temporal trace of the respective situation. This has the consequence that the final semantic representation of (16a) is the one given in (18) below[2]:

(18) Most s $[\exists x.\ car(x) \wedge \exists s'[is\_bought(x, s') \wedge \boldsymbol{\tau(s') < t_0} \wedge \mathbf{in\_80s(s')}]$
$\wedge\ in(x, s) \wedge \boldsymbol{\tau(s) \subseteq \tau(s')}]$
$[\exists x.\ car(x) \wedge \exists s'[is\_bought(x, s') \wedge \tau(s') < t_0 \wedge in\_80s(s')]$
$\wedge\ blue(x, s) \wedge \boldsymbol{\tau(s) < t_0}]$

According to (18), sentence (16a) is true if most (minimal) situations *s* that contain a car that was bought in the eighties and that are furthermore temporally

[2] Note that we assume that the second occurrence of s´ is bound dynamically by the existential quantifier that also binds this variable within the relative clause (see Staudacher 1987, Groenendijk and Stokhof 1990 and Chierchia 1995b for a detailed discussion of the principles of dynamic binding).

located within the respective buying situations are also (minimal) situations such that a car that was bought in the eighties is blue in *s* and such that *s* is temporally located before the time of utterance. This is perfectly coherent, and (16a) is accordingly predicted to be acceptable.

Let us turn to (10c) next, which is repeated below as (19a). If the same strategy is applied in this case, we get the semantic representation in (19b) below:

(19) a. ?? A car that was bought in the eighties is usually BLUE.

b. $$\begin{aligned}&\text{Most s } [\exists x.\ \text{car}(x) \wedge \exists s'[\text{is\_bought}(x, s') \wedge \boldsymbol{\tau(s') < t_0} \wedge \textbf{in\_80s(s')}]\\ &\quad \wedge \text{in}(x, s) \wedge \boldsymbol{\tau(s) \subseteq \tau(s')}]\\ &\quad [\exists x.\ \text{car}(x) \wedge \exists s'[\text{is\_bought}(x, s') \wedge \tau(s') < t_0 \wedge \text{in\_80s}(s')]\\ &\quad \wedge \text{blue}(x, s) \wedge \boldsymbol{t_0 \subseteq \tau(s)}]\end{aligned}$$

In this case, the tense specification in the restrictor contradicts the one within the nucleus: according to the restrictor, the situations quantified over have to be located in the eighties (as they are set to the temporal traces of the respective buying situations that took place in the eighties). On the other hand, the tense marking of the matrix predicate *is blue*, which is interpreted in the nucleus, requires the very same situations to be located within an interval that includes the time of utterance. But this has the consequence that the intersection between restrictor and nucleus is necessarily empty, as there can be no situations that satisfy both requirements.

We assume that this is the reason why (19a) does not get a QV-reading and is therefore very odd, as the only other interpretation that is available requires the hearer to make the very unlikely assumption that there is some specific car that constantly changes its color (see section 1).

In Endriss and Hinterwimmer (to appear) we discuss some cases where the *interval resolution strategy* – which is, after all, a pragmatic strategy – is overridden by other factors. One such case is sentence (20) below, which has a QV-reading in spite of the fact that the tense of the matrix verb does not agree with the tense of the relative clause verb. We argue that the relevant factor in this case is that the matrix verb is a verb of creation.

(20) A car that was built in the eighties is usually BLUE.

We assume that in such cases the IRS does not apply, and i_s is set to the default time interval t_{world} for the following reason: setting the matrix verbs to past tense and then applying the IRS to the resulting sentence would have the consequence that the resulting minimal variant of (20) could only be true if the individuals contained within the situations quantified over were already in the state denoted by the matrix verbs *before* they came into existence, i.e. before the respective relative clause situations were completed. In other words, in contrast to the case of (10a) vs. (10c) there is no way to (minimally) alter the sentence in such a way that the resulting semantic representation conforms to the IRS and has non-absurd truth conditions at the same time[3]. We assume that this is reason enough for the IRS (which is just a pragmatic strategy) to be cancelled. This has the consequence that i_s is set to the default time interval t_{world}. As a consequence of this move, sentences like (20) receive non-contradictory QV-readings in spite of the non-agreeing tense markings.

---

[3] In Endriss and Hinterwimmer (to appear), we furthermore discuss the fact that also in sentences where there is a plausible (direct or indirect) causal relation between the respective relative clause situations and the matrix situations, the tense agreement constraint does not seem to hold (as is evidenced by the contrast between sentence (i) and sentence (ii) below). We argue that in these cases a similar reasoning applies as in (20) above: If the matrix verb was set to past tense, and if the interval resolution strategy was applied, the most plausible reading of the respective sentence could not be conveyed.

(i) A lawyer who was educated in Berlin is usually competent.

(ii) ?? A lawyer who was educated in Berlin is usually blond.

In the next section we return to the question of how QVEs in sentences with plural definites can be accounted for and discuss a prima facie plausible analysis. We will see, however, that this analysis does not work in the cases under consideration.

3 First Attempt: Co-varying Individuals

Let us return to sentence (7a), which is repeated below as (21a). As already mentioned, (7a) also obeys the *tense agreement constraint*, as is evidenced by the unacceptability of (8a), which is repeated below as (21b). Prima facie, it thus appears likely that these cases, too, involve quantification over situations.

(21) a. The people who lectured at the conference last summer were usually SMART.

b. * The people who lectured at the conference last summer are usually SMART.

Now, what options are there to explain the fact that those sentences receive QV-readings if one wants to stick to the assumption that Q-adverbs are only able to quantify over situations? It is clear that QVEs in sentences with definites do not come about in the same way as QVEs in sentences with indefinites: in contrast to the indefinite determiner, the definite determiner is not allowed to pick out different individuals from one and the same set in different situations. Rather, it has to pick out the maximal sum individual contained within the set it is applied to (see Sharvy (1980) and Link (1983)). This has the consequence that co-variation with the situations quantified over by a Q-adverb is excluded if the set denoted by the NP-complement of the definite determiner does not vary itself. To put it the other way around, co-variation is only possible if the NP-complement of the definite determiner includes a situation variable that allows the set denoted by this NP to vary with the situations quantified over.

There are indeed cases where it is plausible to assume that QVEs arise precisely in this way. As argued for in detail in Hinterwimmer (2005) and Hinterwimmer (in preparation), though, in all of these cases the definite DP is interpreted in the nuclear scope of the Q-adverb, while the restrictor contains a situation predicate that can be accommodated on the basis of contextual or clause internal information and that fulfils the following condition: it characterizes a set of situations such that each of those situations can plausibly be assumed to contain either exactly one (in the case of singular definites) or a plurality of individuals (in the case of plural definites) that satisfy the respective NP-predicate. In other words: it is not the case that the situations quantified over are defined on the basis of the denotation of the DP (as with indefinites). Rather, it has to be made sure independently that each of those situations contains individuals/exactly one individual of the required kind.

Hinterwimmer (2005; in preparation) argues that this is due to the fact that the definite determiner *presupposes* that the set it applies to contains a unique maximal element. Therefore, in order for this presupposition to be fulfilled at the point where the meaning of the respective definite DP is computed, it has to be guaranteed that each of the situations quantified over makes available such a set. In order to see this, consider the contrast between (22a) and (23a), on the one hand, and (22b) and (23b), on the other

(22) a. ?? The piano-player is usually SMART.

b. I love going to jazz-concerts: The piano-player is usually SMART (and it's nice to talk to him after the show).

(23) a. ?? The violin-players are usually TALL.

b. There's a funny generalization concerning classical concerts: The violin-players are usually TALL.

In the absence of a context that makes available a suitable situation predicate, the respective definite DPs cannot be interpreted as co-varying with the situations quantified over, and the sentences containing them are very odd, as the matrix predicates are i-level predicates. If such a context is provided, on the other hand, the same definites can be interpreted as co-varying: in (22b), the piano-players vary with the jazz concerts, and in (23b), the violin-players vary with the classical concerts.

There are also cases where no context is required in order to accommodate a suitable situation predicate, but where this is possible on the basis of clause-internal information alone: namely, if the respective NP-predicate is stereotypically associated with a set of situations such that each of those situations contains either exactly one or a plurality of individuals that satisfy this predicate. Such examples are given in (24) below:

(24) a. Peter's students are usually SMART.

b. The pope is often ITALIAN.

In the case of (24a), the noun *students* is naturally associated with a set of suitable situations, namely a set of courses. Also in the case of (24b), the noun is stereotypically associated with a set of situations, albeit "world-size" ones: namely the terms of office of the respective popes.

Technically, we follow Hinterwimmer's (2005; to appear) account of how co-variation arises in the cases under consideration: nouns contain a free variable ranging over situations (see Kratzer 1989, 2004, von Fintel 1994, 2004, Percus 2000, Büring 2004 and Elbourne 2005). These variables can either be resolved to w_0 (i.e. to the actual world) by default, or to a contextually salient situation, or they can be bound by a Q-adverb that c-commands the respective DP at LF. In cases like (22b), (23b) and (24), the last option is chosen. The relevant reading of a sentence like (24a), for example, can thus roughly be represented as shown in (25) below.

(25) Most s [course_taught_by_Peter(s)]
[smart(σ{x: student_of_Peter(x, s)}, s)],
where *x* ranges over sums as well as over atomic individuals and
where $\sigma\{x: P(x)\} =_{def} \iota x\, [P(x) \wedge \forall y\, [P(y) \rightarrow y \leq x]]$ (see Link (1983).

Returning to the examples in (21), we have to decide whether in those cases QVEs come about in the way just described. Obviously, there is no contextual information on the basis of which a suitable situation predicate could be accommodated – i. e. a predicate that characterizes a set of situations such that each of those situations contains a (different) plurality of individuals that satisfy the respective NP-predicates. This only leaves open the possibility that such a predicate is accommodated on the basis of the NP-predicates themselves.

But is it plausible to assume that these NPs provide the necessary information? Of course, they both contain relative clauses that introduce situations. But those situations already contain *the whole sum of individuals that satisfy the respective predicate* – i. e. the whole sum of lions seen by Peter during his safari (cf. ex. (2a)), and the whole sum of individuals who lectured at the conference (cf. ex. (1a)) mentioned. This implies, however, that on the basis of these situations no suitable predicate can be accommodated, i. e. no situation predicate such that each of the situations characterized by this predicate contains a *different* set of lions, or a *different* set of people giving lectures.

On the other hand, it is not plausible that the NP-predicates are in some other way stereotypically associated with a set of situations of the required kind, as they are far too special. We therefore conclude that the QV-readings of sentences like (21a, b) do not come about via co-variation of the individuals denoted by the plural definites with the situations quantified over.

Consequently, only the following possibility seems to be left: the Q-adverb quantifies over the atomic parts of the sum individuals denoted by the respective DPs. But if this really was the case, it would be completely unexpected that sentences such as (21a) have to obey the tense agreement constraint, as evidenced by the unacceptability of (21b) above. After all, in the case of singular indefinites the tense agreement constraint was our main motivation for assuming that QVEs come about as indirect effects of quantification over situations. We therefore have to look for a solution that allows us to stick to the assumption that Q-adverbs only quantify over situations. This is what we will do in the next section, where we discuss Nakanishi and Romero's (2004) analysis of *for the most part* and show that a similar mechanism gives the right results for the cases under consideration, which involve frequency adverbs like *usually*. Somewhat ironically, however, we will see later on that there are good reasons to analyse adverbs of quantity like *for the most part* in a manner that does not necessarily involve quantification over situations/eventualities.

4 Second Attempt: Quantification Over Situations

4.1 Nakanishi and Romero (2004) on the Q-adverb *for the most part*

As already mentioned in section 1, a sentence like (26a) has a QV-reading that can be paraphrased as in (26b):

(26) a. For the most part, the students admire [Mary]$_F$
(Nakanishi & Romero (2004): ex. (31a)).

b. Most of the students admire Mary.

Based on differences regarding focus-sensitivity and the availability of collective readings in sentences with accomplishment verbs, Nakanishi & Romero (2004) argue that while the quantificational determiner *most* operates on plural individuals, the Q-adverb *for the most part* operates on plural eventualities. We postpone the discussion of their arguments to section 7, and simply discuss the mechanism they propose in this section, as this mechanism contains the basic ingredients that are necessary to account for the data discussed above.

Nakanishi & Romero (2004) assume that a sentence of the form *For the most part NP VP* has the truth conditions in (27) below, where **p** corresponds to the denotation of the non-focussed material, while **q** corresponds to the denotation of the focussed material. Note furthermore that they assume a neo-Davidsonian event semantics (see Parsons 1990, Schein 1993, Herburger 2000, and Landman 2000 for discussion), according to which verbs only introduce an event argument directly, while the individual arguments of verbs are introduced via thematic-role predicates like *Agent*, *Theme*, etc., and are combined with the predicate denoted by the verb via conjunction.

(27) $\exists e\, [\mathbf{p}(e) \wedge \exists e'[e' \leq e \wedge |e'| \geq \frac{1}{2}|e| \wedge \forall e''[e'' \leq e' \rightarrow \mathbf{q}(e'')]]]$
(op. cit.: 8).

"There is a general (possibly plural) event e for which **p**(e) holds and there is a (possibly plural) event e' that is a major part of e such that, for all subevents e´´ of e´, **q**(e´´) holds."
(Nakanishi and Romero 2004: 8).

Nakanishi and Romero assume that a QV-reading "with respect to a given NP arises as a side effect of the following choices" (op. cit.: 9):

(28) (i) The semantic content and thematic predicate on the NP are within the restrictor **p**.

(ii) The general event e is 'measured' by counting its atomic event units in $[[V^0]]$.

(iii) The NP is interpreted distributively in a one-to-one mapping.

According to Nakanishi & Romero (2004), sentence (26a) above is thus interpreted as given in (29):

(29) a. $\exists e\ [\ {*}admire(e) \wedge Agent\ (e, the\ students) \wedge \exists e'[e' \leq e \wedge |e'| \geq ½|e| \wedge \forall e''[e'' \leq e' \rightarrow Theme\ (e'', Mary)]]]$ (op. cit.: (31b))

b. "There is a general (possibly plural) event e such that *admire(e) $\wedge$ Agent (e, the students) and there is a (possibly plural) event e′ that is a major part of e such that, for all subevents e′′ of e′, Theme(e′′, Mary)" (op. cit.: (31c)).

Note that this analysis only works under the following two assumptions:

(a) The individual arguments of verbs are separated from the respective verbal predicate at the level of semantic interpretation.

(b) The denotation of the whole clause minus the Q-adverb is "cut" into two parts: one part that contains non-focal material, and one part that contains focal material.

As Nakanishi & Romero (2004) acknowledge themselves, these two assumptions are crucial for the following reason: if **q** in the formula above was replaced by an eventuality predicate that contains the NP relative to which the QV-reading arises, one would not get the desired reading, as the sum individual denoted by this NP would stand in the respective thematic relation to each atomic part of the smaller event *e′′*.

The second assumption is problematic for the following reason: Nakanishi and Romero (2004) do not offer a mapping algorithm that would give us the desired result, and it is not at all clear what such a mechanism would look like. One possibility would be the following: the whole clause minus the Q-adverb is adjoined to the XP dominating the Q-adverb, leaving behind a copy (see Chomsky 1995). In the higher copy the focus-marked constituents are deleted, while in the lower copy the non-focus-marked constituents are deleted. This is similar to the algorithm proposed by Herburger (2000), the only difference being that according to the latter nothing is deleted in the lower copy, i. e. also non-focal material is repeated there.

What is problematic about this algorithm as well as about the one proposed by Herburger (2000) is the fact that it is hard to imagine how the parts of the original clause should be interpreted in a compositional manner. How, for example, should an object like *the students admire* (with *Mary* deleted) be interpreted correctly (i e. with *the students* as the Agent, not the Theme), and why should the focus-marked DP *Mary* be interpreted as *Theme(e, Mary)*?

This problem could only be avoided if deletion did not apply to syntactic objects at LF, but to the denotations of these objects at the level of semantic interpretation, i. e. if the two copies were both interpreted semantically before the objects corresponding to the focus-/non-focus-marked parts of the original sentence get deleted. This, however, is a dubious assumption, as deletion is normally conceived of as a syntactic operation.

Despite these problems, which are specific to this particular implementation, the underlying ideas of the mechanism just outlined can be applied to our problem concerning the interpretation of sentences with plural definites. We propose that QVEs in sentences with plural definites come about as indirect effects of a quantification over the atomic parts of complex situations. In the next section we develop an approach that avoids the problems mentioned above and can be applied in the context of sentences that contain frequency adverbs like *usually*[4].

4.2 Applying Nakanishi and Romero's (2004) idea to our cases

Let us assume that frequency adverbs like *usually* can quantify over the atomic parts of complex situations. This means that such Q-adverbs have to be ambiguous: in order to account for the QV-readings of sentences with singular indefinites and singular definites (and also co-varying plural definites, of course; see section 3), one still has to assume that there is a version of the respective Q-adverb that establishes a relation between two sets that have (minimal) situations as elements. But in light of the fact that sentences containing non-covarying plural definites get QV-readings (cf. section 3), a second, closely related meaning of the respective Q-adverb has to be available.

This second meaning is modelled after the denotation Nakanishi and Romero (2004) assume for the Q-adverb *for the most part*. It introduces two existential quantifiers over (possibly complex) situations, and establishes a relation between the atomic parts of those situations: the cardinalities of the sets of atoms the two situations consist of have to stand in the respective relation.

But now the crucial question is: how to determine the two complex situations that are related this way, i.e. which part of the (denotation of the) original clause is predicated of the first one, and which part is predicated of the second one?

In order to avoid the problems of Nakanishi and Romero's (2004) analysis mentioned above, we assume a mapping algorithm that builds on Diesing (1992) and Chierchia (1995a). Its main features can be summarized as follows:

- Q-adverbs are base generated in vP-adjoined position.

---

[4] As already mentioned, a discussion of the sentences that motivate Nakanishi and Romero's (2004) account is postponed to section 7.

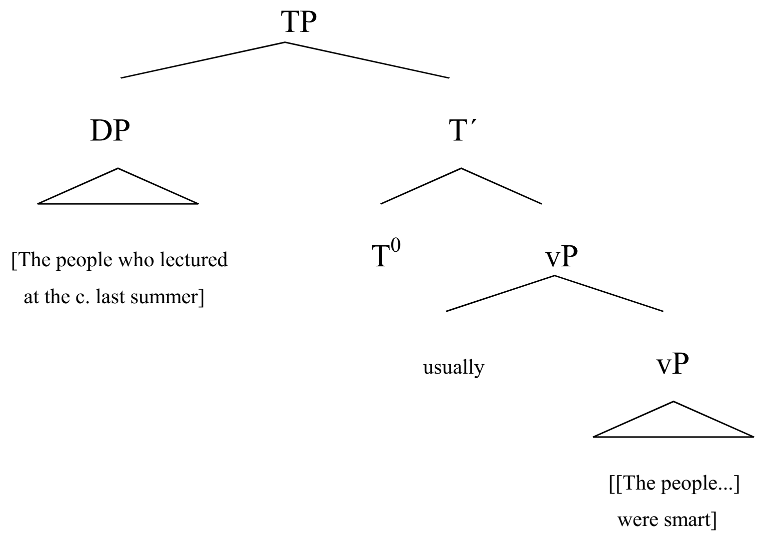
- All the arguments of a verb (including subjects) are base generated in vP-internal position (see Sportiche 1988 and Fukui 1988).
- Topical material cannot be interpreted in the nuclear scope of a quantifier and therefore has to be interpreted in a position where it c-commands the respective Q-adverb (see Endriss and Hinterwimmer to appear-b).
- Focal material has to occupy a vP-internal position at LF.
- Moved DPs leave behind full copies.
- There are various options to interpret the resulting chains: either the highest copy is deleted (this corresponds to reconstruction, which is needed anyway), or the lower copy is interpreted as a variable that is bound by a lambda-operator inserted directly beneath the higher copy (as in Heim and Kratzer 1998), or both copies are interpreted. The last option yields a well formed result only in the presence of a Q-adverb, as we will see shortly.
- DPs that c-command a Q-adverb at LF are optionally turned into situation predicates via a simple type shift the details of which are given below.
- The denotations of Q-adverbs are set up in such a way that the material they c-command at LF is interpreted as their "nuclear scope", while the material that c-commands them at LF is interpreted as their "restrictor" (cf. Chierchia 1995a).

In order to see how this works, let us apply this mechanism to a concrete example – our familiar (21a), which is repeated below as (30).

(30) The people who lectured at the conference last summer were usually SMART.

Assuming that the definite DP is interpreted as topical, and that the chain created by moving this definite DP into (Spec, TP) is interpreted according to the third option mentioned above, the sentence gets the (simplified) LF-representation given in (31).

(31)



Let us first turn to the interpretation of the Q-adverb *usually*: according to our assumptions, it comes in two closely related versions (given in (32a, b)), of which the second is relevant in the present context.

(32) a. $[[\text{usually}]]_1 = \lambda P \lambda Q. |\{s: Q(s) \wedge C(s)\} \cap \{s_1: P(s_1)\}| > ½ |\{s: Q(s) \wedge C(s)\}|$

b. $[[\text{usually}]]_2 = \lambda P \lambda Q.\ \exists s\ [Q(s) \wedge C(s) \wedge \exists s_1 \leq s\ [|s_1| > ½ |s| \wedge P(s_1)]]$

Consider next the higher copy of the definite DP. Its original denotation is given in (33). Note that we assume that the free situation variable contained within the higher copy is resolved to w_0 by default[5].

[5] Note that it cannot be interpreted as bound by the Q-adverb, as the latter does not c-command it.

(33) [[the people who lectured at the conference last summer]] =
$\sigma\{x: \text{person}(x, w_0) \wedge \exists s_1[\text{lecture}(x, s_1) \wedge \text{at(the c. last summer}, s_1) \wedge \tau(s_1) < t_0]\}$

As already mentioned above, we assume that DPs can be turned into situation predicates in a rather simple and straightforward manner: if they are of type *e*, the situation predicate *λxλs. in (x, s)* applies to them, if they are of type <<*e, t*>, *t*>, they apply to this situation predicate. In the case of (33), this gives us the object in (34):

(34) $\lambda s.\ \text{in}(\sigma\{x: \text{person}(x, w_0) \wedge \exists s_1[\text{lecture}(x, s_1) \wedge \text{at(the c. last s.}, s_1) \wedge \tau(s_1) < t_0]\}, s)$

Let us turn to the lower copy of the definite DP next. As this copy is c-commanded by *usually*, the free situation variable contained within it can be turned into a variable bound by this Q-adverb. Let us assume for concreteness that this comes about as follows: a situation variable binding operator that is modelled after the individual variable binding operator proposed by Büring (2004)[6] is inserted below the Q-adverb, which has the consequence that every free situation variable in the scope of this operator (and therefore in the scope of the Q-adverb) is bound by a lambda-operator. This has the consequence that it is turned into a variable bound by the respective Q-adverb when the denotation of this Q-adverb is applied to the resulting object. The operator (which is labelled

[6] Büring (2004: 47) himself also proposes an extension of his pronoun binding rule to situation pronouns. This extension, however, is not intended to apply to adverbially quantified sentences (which he does not discuss in his paper), but rather to a different phenomenon: to the indirect binding of situation variables that are contained within definite descriptions and E-type pronouns (which he, following Elbourne 2001, takes to be nothing but definite descriptions the descriptive content of which has been elided) by c-commanding quantificational DPs. It is thus formulated differently.

γ) is defined in (35) below, and the result of applying it to the vP-segment c-commanded by *usually* is given in (36):

(35) $[[\gamma_n \text{ XP}]]^{w,g} = \lambda s.\ [\ [[\text{XP}]]^{w,\ g[n\rightarrow s]}\ (s)\ ]$

where *g[n→s]* is the assignment function that (possibly) differs from the assignment function *g* insofar as it assigns the value *s* to all situation variables bearing the numerical index *n* (which – in the present context – is assumed to match the numerical index of the free situation variable contained within the plural definite).

(36) $\lambda s.\ \text{smart}(\sigma\{x\text{: person}(x, s) \wedge \exists s_1[\text{lecture}(x, s_1) \wedge \text{at(the c. last s.}, s_1) \wedge \tau(s_1) < t_0]\}, s)$

Let us now turn our attention to a point that we have ignored so far: the matrix predicate *were smart* has to be interpreted distributively if it is applied to a sum individual, while in the case of the relative clause predicate *lectured* this is at least the preferred option. Let us therefore assume that both predicates are shifted accordingly via a distributivity-operator[7] that applies to them, as shown in (37a, b) below (cf. Lasersohn 1998, who builds on Link 1983, 1987):

(37) a. $\text{DIST}(\lambda x \lambda s.\ \text{lecture}(x, s) \wedge \tau(s) < t_0) =$
$\lambda x \lambda s.\ \forall y \in \text{Atom}(x){:}\ \exists s_1 \leq s.\ \text{lecture}(y, s_1) \wedge \tau(s_1) < t_0$

b. $\text{DIST}(\lambda x \lambda s.\ \text{smart}(x, s) \wedge \tau(s) < t_0) =$
$\lambda x \lambda s.\ \forall y \in \text{Atom}(x){:}\ \exists s_1 \leq s.\ \text{smart}(y, s_1) \wedge \tau(s_1) < t_0$

This has the consequence that the situation predicate that c-commands the Q-adverb is actually spelled out as given in (38a) below, while the one that is c-commanded by the Q-adverb is spelled out as given in (38b):

[7] For concreteness, let us assume that the distributivity-operator is adjoined to the constituents (i.e. the VPs) that denote the respective objects.

(38) a. $\lambda s.\ in(\sigma\{x: person(x, w_0) \wedge \exists s_1[\forall y \in Atom(x): \exists s_2 \leq s_1.\ lecture(y, s_2) \wedge \tau(s_2) < t_0 \wedge at(the\ c.\ last\ summer, s_1)\ ]\}, s)$

b. $\lambda s.\ \forall y \in Atom(\sigma\{x: person(x, s) \wedge \exists s_1[\forall y \in Atom(x): \exists s_2 \leq s_1.\ lecture(y, s_2) \wedge \tau(s_2) < t_0 \wedge at(the\ c.\ last\ summer, s_1)\ ]\}): \exists s_3 \leq s.\ smart(y, s_3) \wedge\ \tau(s_3) < t_0$

The final step now consists in applying the denotation of *usually* given in (32b) above to those two objects, as shown in (39) below:

(39) $\lambda P \lambda Q.\ \exists s\ [Q(s) \wedge C(s) \wedge \exists s_3 \leq s\ [|\ s_3|\ > ½\ |\ s| \wedge P(s)]]$
$(\lambda s.\ in(\sigma\{x: person(x, w_0) \wedge \exists s_1[\forall y \in Atom(x): \exists s_2 \leq s_1.\ lecture(y, s_2) \wedge \tau(s_2) < t_0 \wedge at(the\ conference\ last\ summer, s_1)\ ]\}, s)$
$(\lambda s.\ \forall y \in Atom(\sigma\{x: person(x, s) \wedge ...\}: \exists s_4 \leq s.\ smart(y, s_4) \wedge\ \tau(s_4) < t_0)) \Leftrightarrow$
$\exists s[in(\sigma\{x: person(x, w_0) \wedge \exists s_1[\forall y \in Atom(x): \exists s_2 \leq s_1.\ lecture(y, s_2) \wedge \tau(s_2) < t_0 \wedge at(the\ c.\ last\ s., s_1)\ ]\}, s) \wedge C(s) \wedge \exists s_3 \leq s\ [|\ s_3|\ > ½\ |\ s| \wedge \forall y \in Atom(\sigma\{x: person(x, s_3) \wedge ...\}): \exists s_4 \leq s_3.\ smart(y, s_4) \wedge \tau(s_4) < t_0)]]$

Concerning the question how the cardinalities of the respective situations are determined, the answer is rather obvious: as both situations contain sum individuals with atomic parts, they can naturally be divided into parts that stand in 1:1-correspondence to the atomic parts of the respective sum individuals.

Note furthermore that the problem with Nakanishi and Romero's (2004) analysis discussed in the last section is circumvented in our formalization. Remember that Nakanishi and Romero had to assume that the original event predicate (i.e. the denotation of the whole clause minus the Q-adverb) is split up in the following way: the focal part is predicated of the "smaller" event *e*′, while the non-focal part is predicated of the larger eventuality *e*. This was necessary in order to keep the (non-focal) definite DP from being repeated in the event predicate that is applied to *e*′, as this would prevent the respective sentence from getting a QV-reading. The problem with this assumption, however, is that it is unclear how the required split can be achieved in a compositional manner.

In our formalization this problem does not arise, as the mapping algorithm discussed in this section makes it possible that the situation variable contained within the lower copy of the respective definite DP is turned into a variable that is bound by the existential quantifier introducing the smaller nucleus situation s_3. This has the consequence that only the larger restrictor situation s contains the maximal sum of individuals that satisfy the respective NP-predicate in the actual world, while the nucleus situation s_3 only contains the maximal sum of individuals that satisfy this predicate in s_3. Furthermore, the cardinality of s_3 is required to be at least more than half of the cardinality of s. As the cardinality of the respective situations is determined in the way described above, it is clear that the cardinality of the maximal sum individual contained in s_3 is at least more than half of the cardinality of the maximal sum individual contained in s. And that is exactly what we want, as it accounts for the QV-reading we wanted to account for.

Note furthermore that in this case the presupposition associated with the definite determiner does not give rise to the presupposition problem mentioned in section 3: if s contains the maximal sum individual that satisfies the predicate in w_0, then it is automatically guaranteed that there is a sum individual that satisfies the same predicate in a smaller situation s_3 that is a part of s. In other words, it is thus guaranteed that the "second" σ-operator does not apply to the empty set.

In the next section we will combine this analysis with the results of section 2 in order to account for the fact that the tense agreement constraint also holds in sentences containing plural definites.

5 The Tense Agreement Constraint in Sentences with Plural Definites

Recall our assumption from section 2 that the C-variable introduced in the restriction of a Q-adverb needs to be resolved to the most salient time interval that is available, as situations need to be located in time.

Now, the analysis in section 4.2 forced us to assume that Q-adverbs come in two, systematically related variants: one that takes the characteristic functions of two sets of atomic situations as arguments, and specifies a relation between the cardinalities of the two sets, and one that takes the characteristic functions of two complex situations as arguments, and specifies a relation between the cardinalities of the two sets containing the atomic parts of these situations. It is therefore natural to assume that the same principles apply to those two variants as far as the resolution of the respective C-variables is concerned. This has the consequence that also in the case of the second variant, the C-variable introduced by the first existential quantifier – i.e. in the "restrictor situation" – needs to be resolved in accordance with the *interval resolution strategy* discussed in section 2.3.

Consider again sentence (21a) (repeated as (40a)) and its interpretation in (39) above, repeated as (40b):

(40) a. The people who lectured at the conference last summer were usually SMART.

b. $\exists s[in(\sigma\{x: person(x, w_0) \wedge \exists s_1[\forall y \in Atom(x): \exists s_2 \leq s_1.\ lecture(y, s_2) \wedge \tau(s_2) < t_0 \wedge at(\text{the c. last s.}, s_1)\ ]\}, s) \wedge C(s) \wedge \exists s_3 \leq s\ [|s_3| > \frac{1}{2}|s| \wedge \forall y \in Atom(\sigma\{x: person(x, s_3) \wedge ...\}: \exists s_4 \leq s_3.\ smart(y, s_4) \wedge \tau(s_4) < t_0)]]$

Now, the next step consists in resolving C to the predicate $\lambda s.\ \tau(s) \subseteq i_s$, as shown in (41) below (cf. section 2.3):

(41) $\exists s[in(\sigma\{x: person(x, w_0) \wedge \exists s_1[\forall y \in Atom(x): \exists s_2 \leq s_1. lecture(y, s_2) \wedge \tau(s_2) < t_0 \wedge at(the\ c.\ last\ s., s_1)\ ]\}, s) \wedge \boldsymbol{\tau(s) \subseteq i_s} \wedge \exists s_3 \leq s\ [|s_3| > \frac{1}{2}|s| \wedge \forall y \in Atom(\sigma\{x: person(x, s_3 \wedge ...\}: \exists s_4 \leq s_3. smart(y, s_4) \wedge \tau(s_4) < t_0)]]$

After this has been done, i_s needs to be resolved to a time interval in accordance with the *interval resolution strategy* (cf. (17)), repeated as (42).

(42) 1. Take direct, overt information, where intervals denoted by temporal adverbs modifying the matrix verb count as *direct, overt information*.

2. If not available: take the most specific indirect information originating from the same domain, where the restrictor and the nucleus of a Q-adverb count as domains, respectively.

3. If not available: take either indirect information originating from the other domain, or the default interval t_{world}, which denotes the whole time axis.

As there is no temporal adverbial available within the matrix clause in the case of (40b), step 2. has to be taken, i.e. i_s has to be resolved to the most specific interval that is available within the local context[8]. The most specific temporal information available within the local context is of course the interval where the situation introduced by the relative clause modifying the definite DP is located, i.e. $\tau(s_1)$. Therefore, i_s has to be resolved to $\tau(s_1)$ as shown in (43)[9]:

---

[8] Note that while formulas like (41) do not contain a restrictor in the usual sense, the predicate that applies to the first existentially quantified situation corresponds to the restrictor.

[9] In order for formulas like (43) to be well-formed, we have to assume that the σ-operator is externally dynamic, i.e. that the existential quantifier binding the situation variable *s´* in the relative clause is allowed to bind the occurrence of this variable inside the conjunct $\tau(s) \subseteq \tau(s_1)$, which is outside the scope of the σ-operator.

(43) $\exists s[in(\sigma\{x: person(x, w_0) \wedge \exists \mathbf{s_1}[\forall y \in Atom(x): \exists s_2 \leq \mathbf{s_2}. lecture(y, s_2) \wedge \tau(s_2) < t_0 \wedge at(the\ c.\ last\ s., s_1)\ ]\}, s) \wedge \tau(s) \subseteq \boldsymbol{\tau(s_1)} \wedge \exists s_3 \leq s\ [|s_3| > ½|s| \wedge \forall y \in Atom(\sigma\{x: person(x, s_3) \wedge ...\}: \exists s_4 \leq s_3. smart(y, s_4) \wedge \tau(s_4) < t_0)]]$

In (43) there is no conflicting tense information: the restrictor situation *s* is located within the same interval where s_1 is located, which in turn is located in the summer of the year before the time of utterance. The nucleus situation s_3, on the other hand, which is a part of *s*, is located within an interval that ends before the speech time. As those two tense specifications do not contradict each other, the sentence is correctly predicted to be acceptable on a QV-reading.

Let us next turn to sentence (21b), repeated as (44a), which receives the basic semantic representation in (44b):

(44) a. * The people who lectured at the conference last summer are usually SMART.

b. $\exists s[in(\sigma\{x: person(x, w_0) \wedge \exists s_1[\forall y \in Atom(x): \exists s_2 \leq s_1. lecture(y, s_2) \wedge \tau(s_2) < t_0 \wedge at(the\ c.\ last\ s., s_1)]\}, s) \wedge \tau(s) \subseteq i_s \wedge \exists s_3 \leq s\ [|s_3| > ½|s| \wedge \forall y \in Atom(\sigma\{x: person(x, s_3) \wedge ...\}): \exists s_4 \leq s_3. smart(y, s_4) \wedge t_0 \subseteq \tau(s_4)]]$

Now, according to the *interval resolution strategy*, i_s has to be resolved to the temporal trace of the relative clause situation s_1 in this example as well, as this is the most specific information locally available. This gives us (45) below:

(45) $\exists s[in(\sigma\{x: person(x, w_0) \wedge \exists \mathbf{s_1}[\forall y \in Atom(x): \exists s_2 \leq s'. lecture(y, s_2) \wedge \tau(s_2) < t_0 \wedge \mathbf{at(the\ c.\ last\ s., s_1)}\ ]\}, s) \wedge \boldsymbol{\tau(s) \subseteq \tau(s_1)} \wedge \exists s_3 \leq s\ [|s_3| > ½|s| \wedge \forall y \in Atom(\sigma\{x: person(x, s_3) \wedge ...\}: \exists \mathbf{s_4} \leq \mathbf{s_3}. smart(y, s_4) \wedge \mathbf{t_0} \subseteq \boldsymbol{\tau(s_4)}]]$

In this case, we have contradicting tense information: on the one hand, the restrictor situation *s* has to be located within the temporal trace of a situation that took place in the year before the time of utterance. On the other hand, there has to be a part s_3 of *s* such that s_3 consists of smaller situations the temporal traces of which include the speech time (which has the consequence that the temporal trace of s_3 includes the speech time). But this necessarily leads to a contradiction: (44a) can never be true, as it is logically impossible that there is a situation that took place before the speech time as a whole, but has parts that include the speech time. We therefore correctly predict that (44a) does not receive a QV-reading and is thus odd (at least if *be smart* is not re-interpreted as a stage level predicate) – for essentially the same reason as the structurally similar sentences with singular indefinites discussed in section 2 were odd. This is good evidence that *usually* quantifies over situations in the case of sentences with plural definites as well.

In the next section we turn to the coincidence constraint, which also sets sentences containing frequency adverbs like *usually* apart from sentences with quantificational DPs as well as from ones containing the Q-adverb *for the most part*.

6 The Coincidence Constraint

6.1 Empirical evidence

As already mentioned in section 1, (9a), repeated as (46a), with the Q-adverb *usually* is odd, whereas a corresponding sentence with the Q-adverb *for the most part* or a quantificational DP headed by *most* are both perfectly acceptable:

(46) a. * The people who listened to Peter's talk at the conference last summer were usually SMART.

b. For the most part, the people who listened to Peter's talk at the conference last summer were SMART.

c. Most of the people who listened to Peter's talk at the conference last summer were SMART.

According to the interval resolution strategy, (46a) is interpreted as shown in (47) below (note that in this case the relative clause predicate is interpreted distributively again):

(47) $\exists s[\mathrm{in}(\sigma\{x: \mathrm{person}(x, w_0) \wedge \exists \mathbf{s_1}[\forall y \in \mathrm{Atom}(x): \exists s_2 \leq s_1.$
$\mathrm{listen\_to}(\text{P.'s talk}, y, s_2) \wedge \tau(s_2) < t_0 \wedge \mathbf{at(the\ c.\ last\ s., s_1)}\ ]\}, s)$
$\wedge\ \boldsymbol{\tau(s) \subseteq \tau(s_1)} \wedge \exists s_3 \leq s\ [|s_3| > \frac{1}{2}|s|$
$\wedge\ \forall y \in \mathrm{Atom}(\sigma\{x: \mathrm{person}(x, s_3) \wedge ...\}): \exists \mathbf{s_4} \leq \mathbf{s_3}.\ \mathrm{smart}(y, s_4)$
$\wedge\ \mathbf{t_0} \subseteq\ \boldsymbol{\tau(s_4)}]]$

Nothing we have said so far explains the oddity of (46a): there is no contradiction between the temporal location of the restrictor situation *s*, and the temporal location of the nucleus situation s_3. Nevertheless, (46a) is odd, which means that it has to violate some other constraint, which has not yet been identified.

Intuitively, the crucial factor setting (46a) apart from (40a) is the internal constitution of the respective relative clause situations: in the case of (46a), it is natural to assume that the temporal traces of the smaller situations that make up s_1 all coincide temporally. This is due to the following two facts: first, the definiteness of the DP *Peter's talk* requires that everyone listened to the same talk. Second, if one listens to a talk, one normally listens to it from start to finish. Therefore, the temporal traces of all parts s_2 of s_1 such that s_2 is a situation of an atomic part of the plural individual defined above listening to Peter's talk coincide temporally. In the case of (40a), on the other hand, this is different. There, the temporal traces of the atomic situations that the relative clause situation consists of do not have to coincide, as the talks given at a conference are normally distributed over the whole duration of this conference. We will see that this difference in the internal constitution of the relative clause situation also has consequences for the internal constitution of the restrictor situation, as – due to the interval resolution strategy – the restrictor situation is temporally located within the temporal trace of the relative clause situation. But before going into the details, let us first check whether our speculation is on the right track that the internal constitution of the respective relative clause situation is the relevant factor.

Consider (48a) below, which does not receive a QV-reading and is therefore very odd (in contrast to the variants in (48b, c)): also in this case it is intuitively clear that the atomic situations the relative clause situations consist of take place at the same time.

(48) a. * The people who were killed in the car accident yesterday afternoon were usually less than 20 years old.

b. For the most part, the people who were killed in the car accident yesterday afternoon were less than 20 years old.

c. Most of the people who were killed in the car accident yesterday afternoon were less than 20 years old.

Note furthermore that (49) below is only acceptable if it is interpreted in a specific way, namely if one is willing to assume that Peter did not meet all of his colleagues at the same time, but during the course of the afternoon:

(49) The people Peter met yesterday afternoon were usually colleagues of his.

Finally, as noted by Nakanishi and Romero (2004) themselves, sentence (50a) below (their example (52a)) is unacceptable, while the minimally varying (50b), where *usually* has been replaced by *for the most part* is fine. Also in this case it is natural to assume that the unacceptability of the variant with *usually* is due to the fact that all atomic parts of the relative clause situation necessarily coincide temporally – due to the progressive aspect on the verb[10].

(50) a. * The students sitting over there now are usually smart.

b. For the most part, the students sitting over there now are smart.

It thus seems that our speculations are on the right track. In the next section, we will therefore offer an analysis that rests on the idea that the internal constitution of the respective relative clause situations in combination with the *interval resolution strategy* is responsible for the unacceptability of the sentences discussed in this section.

6.2 The analysis

Let us assume that Q-adverbs like *usually* are not allowed to operate on complex situations of any kind, but only on complex situations that satisfy a certain condition concerning the temporal distribution of their atomic parts. The first

---

[10] In their brief discussion, Nakanishi and Romero (2004) speculate that the unacceptability of (50a) is due to the fact that Q-adverbs like *usually* may only quantify over generic situations that satisfy the respective predicate. This is based on the observation that (i) below, where the relative clause verb is marked for generic tense, is fine.

(i) The students who sit over there are usually smart
(Nakanishi and Romero (2004): ex. (51a)).

The problem with this explanation is that it does not cover the acceptable cases discussed in sections 5 and 6, where surely no generic tense is involved. Note furthermore that example (i) is presumably best analyzed in the way discussed in section 3, i.e. as a case where the denotation of the definite DP varies with the situations quantified over.

option that might come to mind would be to only allow a Q-adverb of this class to be applied to a complex situation if this situation consists of atomic parts such that there is no temporal overlap between those parts. This, however, would be too strong: it does not seem to be required that there is no temporal overlap at all between the temporal traces of the respective atoms. Intuitively, a sentence like (40a) above does not become unacceptable if it is uttered in a situation where it is clear that some of the talks mentioned took place at the same time. It seems to be sufficient that at least a substantial portion of them took place at different times. Let us therefore assume that Q-adverbs like *usually* are only allowed to operate on complex situations that consist of atomic parts such that it is not the case that the temporal traces of a substantial proportion among those atoms overlap.

Interestingly, Lasersohn (1995) and Zimmermann (2003) have argued that a similar constraint is operative in the interpretation of pluractional elements such as *occasionally*, *again and again*, etc., where it is also required that the respective atomic events/situations do not overlap.[11]

Note, however, that our above assumption does not automatically account for the oddity of sentences like (46a), (48a) and (50a): after all, it is the respective relative clause situation that would violate the constraint just sketched, not the restrictor situation. But then, as already mentioned, the *interval resolution strategy* forces the respective restrictor situation to be located within the temporal trace of the respective relative clause situation. It is therefore not completely surprising that the internal constitution of the latter has an influence on the internal constitution of the former. But in order to see how this works, it

[11] In fact, the constraint operative in these cases seems to be even stronger: it is not only required that the atomic events/situations do not overlap, but that they are clearly separated in time (cf. Lasersohn 1995 and Zimmermann 2003).

has to be clarified first how the temporal trace of a complex situation that is defined on the basis of its atomic parts is to be determined.

Let us assume that this is done in the most obvious way: the temporal trace of such a complex situation *s* is the smallest discontinuous interval that includes the temporal traces of all atomic parts of *s*. This is given more formally in (51) below:

(51) $\tau(s)$ if *s* is a complex situation that is defined on the basis of its atomic parts :=
$\iota t.\ \forall s_1[s_1 \in \text{Atom}(s) \rightarrow \tau(s_1) \subseteq t] \wedge \forall t_1[\forall s_2[s_2 \in \text{Atom}(s)$
$\rightarrow \tau(s_2) \subseteq t_1] \rightarrow t \subseteq t_1]$

Note that $\tau(s)$ in the formula above is understood to be discontinuous if the atoms that make up *s* are temporally distributed, i.e. $\tau(s)$ does not contain the stretches of time that lie in between the temporal traces of those atoms.

On the basis of (51), the temporal trace of a complex situation *s* is included in the temporal trace of another complex situation s_1 if the smallest (discontinuous) interval that includes the temporal traces of all atomic parts of *s* is included in the smallest (discontinuous) interval that includes the temporal traces of all atomic parts of s_1.

At this point, it becomes relevant that the interval denoting the temporal trace of a complex situation is understood to be discontinuous if the temporal traces of the atoms this complex situation consists of are temporally distributed: this has the consequence that for each atomic part s_2 of a complex situation *s* such that the temporal trace of *s* is included within the temporal trace of a complex situation s_1 there has to be a corresponding atomic part s_3 of s_1 such that the temporal trace of s_2 is included in the temporal trace of s_3. This is given more formally in (52) below:

(52) If s and s_1 are both complex situations (in the above sense), and if $\tau(s) \subseteq \tau(s_1)$, then:
$\forall s_2[s_2 \in \text{Atom}(s) \rightarrow \exists s_3 [s_3 \in \text{Atom}(s_1) \wedge \tau(s_2) \subseteq \tau(s_3)]]$

Let us now return to the question why the internal constitution of the relative clause situation in a sentence like (46a) has an influence on the acceptability of the clause. In (53), the condition discussed above is added to the denotation of *usually*[12] that not all the atomic parts of the restrictor situation may have overlapping running times.

(53) $[[\text{usually}]]_2 = \lambda P \lambda Q.\ \exists s\ [Q(s) \wedge C(s) \wedge \neg\forall s_2, s_3 \in \text{Atom}(s): \tau(s_2)\ \text{o}\ \tau(s_3) \wedge \exists s_1 \leq s\ [|\ s_1| > \tfrac{1}{2}|\ s| \wedge P(s)]]$

With this assumption in place, the unacceptability of a sentence like (46a) is an automatic consequence of (52) above: due to the *IRS*, the temporal trace of the restrictor situation *s*, which is a situation that includes all the people who listened to Peter's talk at the conference last summer, has to be included in the temporal trace of the relative clause situation s_1, which is the situation of these people listening to Peter's talk. This has the consequence that for each atomic part s_2 of *s* that includes one of these people there has to be a corresponding listening situation s_3, which is an atomic part of s_1, such that the temporal trace of s_2 is included in the temporal trace of s_3. Therefore, if the temporal traces of all atomic parts s_3 of s_1 coincide – as it is the case with people listening to a talk from start to finish – , it will also necessarily be the case that all atomic parts s_2 of *s* coincide.

12 This is probably too weak. Rather, what seems to be required is the condition that for a substantial proportion of the respective atomic situations it is the case that their temporal traces do not overlap (see the discussion above). We have, however, employed the condition in (53) in order to keep things simpler, as this is sufficient for our present purposes.

This has the consequence that (46a) is necessarily contradictory under a QV-reading: it could only be true under the condition that the temporal traces of all atomic parts of the restrictor situation *s* coincide (as the *IRS* forces them to be resolved to the temporal traces of the atomic listening situations), while at the same time there are some atomic parts of the restrictor situation *s* such that the temporal traces of those atomic parts do not overlap (this follows from the condition added to the meaning of *usually* in (53)). In order to see this, consider the truth conditions of (46a), repeated below as (54a), in (54b). (Note that *o* stands for "overlaps").

(54) a. * The people who listened to Peter's talk at the conference last summer were usually SMART.

b. $\exists s[\text{in}(\sigma\{x: \text{person}(x, w_0) \wedge \exists s_1[\forall y \in \text{Atom}(x):$
$\exists s_2 \leq s. \text{ listen\_to}(\text{P.'s talk}, y, s_2) \wedge \tau(s_2) < t_0$
$\wedge \text{ at}(\text{the c. last s.}, s_1)\ ]\}, s) \wedge \tau(s) \subseteq \tau(s_1)$
$\wedge \neg\forall s_3, s_4 \in \text{Atom}(s): \tau(s_3) \text{ o } \tau(s_4) \wedge \exists s_5 \leq s\ [|s_5| > \frac{1}{2}|s|$
$\wedge \forall y \in \text{Atom}(\sigma\{x: \text{person}(x, s_5) \wedge ...\}):$
$\exists s_6 \leq s_5. \text{ smart}(y, s_6) \wedge t_0 \subseteq \tau(s_6)]]$

The oddity of sentences like (54a) is thus explained under the assumption that the QV-reading is blocked because it results in a necessary contradiction – similarly to the cases where tense agreement was violated.

In this and the preceding section we have argued that the fact that sentences containing Q-adverbs like *usually* have to obey two newly observed constraints in order to get QV-readings is best explained under the following assumptions: Q-adverbs of this kind only quantify over (minimal) situations, and the two constraints apply to situations, but not to individuals. Now, as already mentioned, sentences that contain the Q-adverb *for the most part* pattern with sentences containing quantificational DPs – i.e. unambiguous individual quantifiers –, not with sentences containing Q-adverbs like *usually*, as far as those constraints are concerned. This makes it unlikely that *for the most part* quantifies over situations. On the other hand, Nakanishi and Romero (2004) have argued that *for the most part* quantifies over events, which are more or less analogous to minimal situations (see Herburger 2000 and Elbourne 2005 for discussion). In the next section, we will thus deal with the arguments put forth by Nakanishi and Romero (2004), and argue for an alternative account of their data, according to which *for the most part* quantifies directly over the atomic parts of plural individuals.

7 *For the most part*: Quantification Over Events or Individuals?

As already discussed in section 4.1, Nakanishi and Romero (2004) assume that QVEs in sentences like (26a) (repeated below as (55a)) arise as indirect effects of event-quantification. According to their account, the sentence is thus interpreted as shown in (55b):

(55) a. For the most part, the students admire $[\text{Mary}]_F$.

b. $\exists e[\text{*admire}(e) \wedge \text{Agent}(e, \text{the students}) \wedge \exists e'[e' \leq e \wedge |e'| \geq \frac{1}{2}|e|$ $\wedge \forall e''[e'' \leq e' \rightarrow \text{Theme}(e'', \text{Mary})]]]$ (op. cit.: (31a,b)).

The assumption that *for the most part* quantifies over events, not over individuals in such cases is mainly based on the following observation: while sentences containing quantificational DPs of the form *most of the NP* allow for collective readings in addition to distributive readings when the matrix verb is an activity verb or an accomplishment verb, sentences containing the Q-adverb *for the most part* only allow distributive readings even in those cases. In order to see this, consider the contrast between (56b, c), on the one hand, and (57a, b), on the other:

(56)	a.	States:	Most of the bottles are too heavy to carry. *collective, √distributive.
	b.	Activities:	Most of the boys lifted the piano. √collective, √distributive.
	c.	Accomplishments:	Most of the boys built a raft. √collective, √distributive.
	d.	Achievements:	Most of the girls found a cat. ?collective, √distributive (op. cit.: (8a-d)).
(57)	a.	Activities:	For the most part, the boys lifted the piano. *collective, √distributive.
	b.	Accomplishments:	For the most part, the girls built a raft. *collective, √distributive (op. cit.: ex. (14a, b)).

In the case of *most of the NP* Nakanishi and Romero (2004) argue for a semantics according to which an existential quantifier over a group is introduced such that the cardinality of this group is greater than half the cardinality of the group denoted by *the NP*. Furthermore, they assume (based on Brisson's 1998, 2003 analysis of *all the NP*s) that *most* signals the presence of the distributivity operator *D* (cf. section 4.2), and that "activities and accomplishments, but not states and achievements, are syntactically decomposed into two VPs [...]: a lower VP whose head is a state and a higher VP whose head is the abstract verb DO" (op. cit.: 4). This has the consequence that there are two possible insertion sites for the *D*-operator with activities and accomplishments: either the higher VP, or the verb DO. In the former case, we get a distributive reading, while in the latter case we get a collective reading, according to which for every atomic part of the respective group there is a different DOing event which is a part of the respective collective event. This is shown in (58) below, where the two readings of (56b) above are given:

(58) a. Distributive: $\exists e \exists x\ [x \leq [[\text{the boys}]] \wedge |x| > \frac{1}{2}\,|[[\text{the boys}]]|$
$\wedge\ \forall z\ [z \leq x \rightarrow \exists e'\ [e' \leq e \wedge \text{lift}(e', \text{the piano})$
$\wedge\ \exists e''[e'' \leq e' \wedge \text{DO}(e'') \wedge \text{Agent}(e'', z)]]]]$

b. Collective: $\exists e \exists x\ [x \leq [[\text{the boys}]] \wedge |x| > \frac{1}{2}\,|[[\text{the boys}]]|$
$\wedge\ \text{lift}(e, \text{the piano}) \wedge \exists e'\ [e' \leq e\ \forall z\ [z \leq x \rightarrow$
$\exists e''\ [e'' \leq e' \wedge \text{DO}(e'') \wedge \text{Agent}(e'', z)]]]]$
(op. cit.: (11a, b)).

Concerning *for the most part*, on the other hand, Nakanishi and Romero (2004) not only assume that this Q-adverb quantifies over events instead of individuals, but they furthermore build distributivity directly into the meaning of the Q-adverb itself, as is evident from (59) below, where we indicate the truth conditions that Nakanishi and Romero (2004) assume for sentences of the form *For the most part NP VP* (see section 4.1).

(59) $\exists e[\mathbf{p}(e) \wedge \exists e'[e' \leq e \wedge |e'| \geq \frac{1}{2}|e| \wedge \forall e''[e'' \leq e' \rightarrow \mathbf{q}(e'')]]]$
(op. cit.: 8),

where **p** corresponds to the denotation of the non-focal part of the clause, while **q** corresponds to the denotation of the focal part.

These truth conditions ensure that QVEs and distributivity always go hand in hand. This is a consequence of the fact that in order for a sentence like (55a) to get a QV-reading (as given in (55b) above), two conditions must be satisfied: (a) the plural definite is interpreted as part of the restrictor because it is non-focal, and (b) there is a 1:1-mapping between the parts of the respective general event and the atomic parts of the sum individual denoted by the plural definite. But as soon as these two conditions are satisfied, it is clear that the sentence gets a distributive reading. Nakanishi and Romero (2004) thus account for the observed difference between sentences of the form *most of the NP VP* and sentences of the form *for the most part NP VP*.

Now, our discussion so far implies that if a sentence does not have to obey the tense agreement constraint and the coincidence constraint, no quantification over (minimal) situations (which are roughly equivalent to events) is involved. But, as already mentioned in section 1, sentences with *for the most part* are perfectly fine even if those constraints are violated – just like sentences containing quantificational DPs:

(60) a. For the most part, the people who lectured at the conference last summer are SMART.

b. For the most part, the people who listened to Peter's talk at the conference last summer are SMART.

We are therefore facing a dilemma, as there seems to be conflicting evidence with respect to the question whether *for the most part* quantifies over situations or over individuals. In principle, two solutions are conceivable: according to the first one, the two constraints discussed in sections 5 and 6 do not signal quantification over situations (or events) per se, but rather signal that Q-adverbs like *usually*, *always* etc. are sensitive to the temporal parameter of situations. According to the second one, *for the most part* quantifies over individuals, but its meaning is defined in such a way that distributivity is guaranteed nonetheless.

In the remaining part of this section, we sketch an analysis of *for the most part* that is in accordance with the second solution, which seems to be more attractive to us: after all, why should there be two kinds of quantifiers which apply to the same domain (namely events), but impose different restrictions on the elements in this domain? Note furthermore that in the case of sentences with question embedding predicates, too, there is evidence that QVEs come about via quantification over situations or events if those sentences contain Q-adverbs like *usually*, while there is no such evidence if those sentences contain Q-adverbs like *for the most part*. Rather, the Q-adverbs in these cases seem to quantify over the atomic parts of the answer to the question denoted by the respective wh-CP directly (Lahiri 2002; but see Beck and Sharvit 2002 for a slightly different analysis), i.e. over the individual propositions that constitute the complete answer to the respective question. In order to see the point, consider the sentences in (61) below:

(61) a. John usually knows who comes to Mary's parties.

b. For the most part, John knows who comes to Mary's parties.

c. ?? John usually knows who came to the party yesterday evening.

d. For the most part, John knows who came to the party yesterday evening.

Intuitively, (61a) quantifies over situations where a question of the following form comes up: *who comes to Mary's party?*, where a different party is at stake in each situation, and it is true if more than half of those situations are also situations where John knows the answer to the respective question. (61b), on the other hand, is true if John can enumerate most people who come to Mary's parties, i.e. if he knows more than half of the propositions that together constitute the complete answer to that question.

That we are on the right track is evidenced by the contrast between (61c) and (61d): in the case of (61c), there is only one single question (due to the indexical element *yesterday*), and it is very unlikely that John's ability to answer this question differs on various occasions (at least in the absence of a special context). The sentence is therefore degraded. In the case of (61d), on the other hand, there is no such problem, for obvious reasons.

While a detailed discussion of QVEs in the case of sentences with question-embedding predicates is beyond the scope of this paper, the differences discussed support our assumption that adverbs of frequency like *usually* unambiguously quantify over situations (or events) and that this is different for adverbs of quantity like *for the most part*. Of course, *for the most part* in (61b, d) above does not quantify over individuals, either. The most plausible assumption would thus be to assume that adverbs of quantity apply to objects of any kind, as long as those objects can naturally be decomposed into parts (cf. Lahiri 2002). This is further evidenced by the example below, where *for the most part* intuitively quantifies over the parts into which Mahler's fifth symphony can be decomposed – for example, the single movements.

(62) For the most part, Adorno liked Mahler's fifth symphony.

We therefore assume that *for the most part* takes individuals of all kinds – abstract ones as well as concrete ones, and atomic individuals as well as sum individuals – that have parts as one of its argument, and a relation between individuals and situations as its other argument. Furthermore, we assume that it yields the value *true* if there is a part *y* of the respective individual *x* whose cardinality is more than half the cardinality of *x* such that for all parts *z* of *y* there is a situation *s´* such that *z* and *s´* stand in the respective relation to each other:

(63) $[[\text{for the most part}]] = \lambda P_{<e, <s, t>>} \lambda x.\ \exists s \exists y\ [y \leq x \wedge |y| > ½ |x| \wedge \forall z\ [z \leq y \rightarrow \exists s'\ [s' \leq s \wedge P(y, s')]]]$

As *for the most part* may either be adjoined to the vP or to the clause as a whole, it needs to be ensured that it combines with its two arguments in the right order. Remember furthermore that *for the most part* is sensitive to information structure in the same way as adverbs of frequency like *usually*: QV-readings only come about if the respective DP is de-accented.

We therefore assume that the mapping algorithm discussed in section 4.2 also applies in the case of *for the most part*: topical DPs are not allowed to be interpreted in the nuclear scope of a Q-adverb and therefore need to be moved out of the c-command domain of this Q-adverb at LF. Furthermore, we assume that such DPs adjoin directly above the Q-adverb, leaving behind a full copy. Concerning this lower copy, however, one of the other options mentioned in section 4.2 is chosen: it is interpreted as a variable that is bound by a lambda-operator inserted beneath the higher copy, which gets its standard interpretation. Note, however, that we need to assume that this lambda-operator is not inserted *directly* beneath the higher copy (as in Heim and Kratzer 1998), but rather beneath the Q-adverb that the higher copy has been adjoined to – otherwise, we would not create the relation between situations and individuals that the Q-adverb takes as one of its arguments. We thus need to assume some flexibility with respect to the insertion site of the lambda-operator, as far as the interpretation of chains is concerned[13].

Applying this to our example (55a) above (which is repeated below as (64a)), we get the (simplified) LF-representation in (64b) below:

(64) a. For the most part, the students admire [Mary]$_F$.

---

[13] Cf. Chierchia (1995b: chapter 3), who adopts an unselective binding approach to adverbial quantification. According to this approach, topical indefinites have to be adjoined to the respective Q-adverb (just like in our approach), leaving behind traces that are interpreted as variables. Furthermore, those variables are bound by a lambda-operator that is inserted beneath the respective Q-adverb. Concerning the moved indefinites (or, in our terminology: the higher copies), they are turned into predicates that the respective Q-adverb can apply to via a mechanism called existential disclosure (Dekker 1993) (note that Chierchia 1995b works within the framework of *dynamic semantics*; see Groenendijk and Stokhof 1990).

b. $[_{TP}$The students$[_{TP}$for the most part λ_x $[_{TP}$ x admires Mary]]].

(64b) is then interpreted as follows: the denotation of *for the most part* in (63) is first applied to the denotation of the TP-segment it c-commands, and then to the sum individual denoted by *the boys*, as shown in (65) below.

(65)
$$\lambda P_{<e,<s,t>>}\lambda x.\ \exists s\exists y\ [y \leq x \wedge |y| > \tfrac{1}{2}|x| \wedge \forall z\ [z \leq y \rightarrow \exists s'\ [s' \leq s \wedge P(z, s')]]]$$
$$(\lambda y \lambda s.\ \text{admires}(\text{Mary}, y, s))\ (\sigma\{z: \text{student}(z, s^*)\}) =$$
$$\exists s\exists y[y \leq \sigma\{z: \text{student}(z, s^*)\} \wedge |y| > \tfrac{1}{2}|\sigma\{z: \text{student}(z, s^*)\}| \wedge \forall z\ [z \leq y \rightarrow \exists s'\ [s' \leq s \wedge \text{admires}(\text{Mary}, z, s')]]]$$

Given these assumptions, it is expected that neither the tense agreement constraint nor the coincidence constraint apply in the case of sentences like (60a) and (60b), as no quantification over situations (or events) is involved. Furthermore, our analysis accounts for the fact that QVEs go hand in with distributivity as well as for the fact that *for the most* part is sensitive to information structure.

Note that our analysis is able to account for the following observation of Nakanishi and Romero (2004) as well: in addition to the QV-readings discussed above, sentences containing this Q-adverb also get what Nakanishi and Romero call *quantification over times readings* and *temporal span readings*. They give examples like the ones below:

(66) a. Quantification over times reading

Q: What tasks did John perform last month?
A: For the most part, he cooked.
≈ Most of the times he performed a task, the task consisted of cooking. (op. cit.: (15)).

b. Temporal span reading

Q: What did Amy do yesterday?
A: For the most part, she was building a sand castle.
≈ Most of yesterday was spent by Amy in building a sand castle.
(op. cit.: (16)).

Nakanishi and Romero (2004) explain the existence of such readings as follows: in the cases under consideration, there is no 1:1 mapping between the parts of the respective restrictor events and the parts of a sum individual that stands in some thematic relation to this restrictor event (as in "QV-cases"). Rather, the parts of the respective event are determined on the basis of their temporal location. If those parts are discontinuous, we get the *quantification over times reading*, while if they are continuous, we get the *temporal span reading*.

Now, note that in contrast to the "QV-examples" discussed above, the *quantification over times reading* as well as the *temporal span reading* is unavailable (or at least very hard to get) if no temporal adverbial denoting a definite time interval has been introduced in the immediate context (as in the examples above):

(67) a. ?? For the most part, John cooked.

b. ?? For the most part, Amy was building a sand castle.

This is unexpected under Nakanishi and Romero's analysis: it should be unproblematic to divide a given event into several (either continuous or discontinuous) units on the basis of its running time. Our analysis, on the other hand, predicts it: recall that *for the most part* needs an expression of type *e* as one of its arguments that can be divided into parts. Therefore, we only need to make the following assumptions in order to explain the pattern above:

- Adverbials like *yesterday*, *last month* etc. denote abstract individuals (namely time intervals), which can naturally be divided into either continuous or discontinuous units.
- These expressions function as elliptical topics in the examples above, which has the consequence that *for the most part* can take them as one of its arguments.
- Furthermore, the respective clauses are interpreted as predicates that hold of the parts of the respective time interval.

The *quantification over times reading* of the answer in (66a) can thus be represented as shown in (68a), and the *temporal span reading* of the answer in (66b) can be represented as shown in (68b) below (abstracting away from the semantics of the progressive aspect):

(68) a. $\exists s \exists y\, [y \leq [[\text{last month}]] \wedge |y| > ½\, |[[\text{last month}]]|$
$\wedge\, \forall z\, [z \leq y \rightarrow \exists s'\, [s' \leq s \wedge \text{cooked(John}, s', z)]]]$

b. $\exists s \exists y\, [y \leq [[\text{yesterday}]] \wedge |y| > ½\, |[[\text{yesterday}]]|$
$\wedge\, \forall z\, [z \leq y \rightarrow \exists s'\, [s' \leq s \wedge$
$\text{was\_building\_a\_sand\_castle(Amy}, s', z)]]]$

This concludes our discussion of the semantics of *for the most part*.

8 Conclusion

In this paper we have discussed QVEs in sentences containing plural definites. We have argued that frequency adverbs like *usually* unambiguously quantify over situations – either over the elements of a set of situations, or over the atomic parts of a complex situation – while adverbs of quantity like *for the most part* unambiguously quantify over the atomic parts of (either abstract or concrete) individuals. This conclusion was based on the fact that sentences containing frequency adverbs behave differently from sentences containing adverbs of quantity with respect to two newly observed constraints: the tense agreement constraint, and the coincidence constraint. While sentences of the former type have to obey these constraints in order to be grammatical, this is not the case for sentences of the latter type. Furthermore, sentences containing adverbs of quantity pattern with sentences containing quantificational DPs in this respect. We have argued that both constraints concern the temporal location of situations, and that the contrast between sentences containing frequency adverbs and sentences containing adverbs of quantity thus shows that only in the former quantification over situations is involved.

An interesting remaining question is what the deeper motivation behind these two constraints is. Concerning the tense agreement constraint, a plausible answer would run as follows: being spatiotemporal creatures, situations need to be located in time, and this is preferably done on the basis of locally available information. Concerning the coincidence constraint, we would like to suggest the following answer: quantification involves establishing a relation between the cardinalities of two sets of elements. This, however, is only possible if the respective elements can be clearly individuated. Otherwise the ban against vacuous quantification (Kratzer 1995) would be violated. Now, it is notoriously difficult to individuate situations or events (in contrast to ordinary individuals). The requirement that the situations quantified over by a Q-adverb need to have non-overlapping temporal traces can thus be seen as a means to facilitate the individuation of these situations.

References

Beaver, D. and B. Clark (2003): *Always* and *Only*: Why not all Focus-Sensitive Operators are Alike. *Natural Language Semantics* 11, 323–362.

Beck, S., and Sharvit, Y. (2002): Pluralities of Questions. *Journal of Semantics* 19:105-157.

Berman, S. (1987): Situation-Based Semantics for Adverbs of Quantification. In: J. Blevins and A. Vainikka (eds.), *University of Massachusetts Occasional Papers* 12, GLSA, University of Massachusetts, Amherst.

Berman, S. (1991): The semantics of Open Sentences. PhD thesis, University of Massachusetts, Amherst.

Brisson, C. (1998): Distributivity, Maximality, and Floating Quantifiers. Ph.D.thesis, Rutgers University.

Brisson, C. (2003): Plurals, All, and the Nonuniformity of Collective Predication. *Linguistics and Philosophy* 26: 129-184.

Büring, D. (2004): Crossover Situations. *Natural Language Semantics* 12, 23-62.

Chierchia, G. (1995a): Individual Level Predicates as inherent Generics. In: G. Carlson and F. J. Pelletier (eds): *The Generic Book.* Chicago: University of Chicago Press.

Chierchia, G. (1995b): *Dynamics of Meaning*. University of Chicago Press, Chicago.

Chomsky, N. (1995): *The Minimalist Program*. Cambridge, Mass.: MIT Press.

Dekker, P. (1993): Existential Disclosure. *Linguistics and Philosophy* 16, 561 – 587.

Diesing (1992): *Indefinites*. Cambridge, Mass.: MIT Press.

Elbourne, P. (2001): E-Type Anaphora as NP-Deletion. *Natural Language Semantics* 9: 241–288.

Elbourne, P. (2005): *Situations and Individuals*. Cambridge, Mass.: MIT Press.

Endriss, C. and S. Hinterwimmer (to appear): Tense and Adverbial Quantification. In: J. Doelling and T. Heyde-Zybatow (eds.), *Event Structures in Linguistic Form and Interpretation*. Berlin: Mouton de Gruyter.

Endriss, C. and S. Hinterwimmer (to appear-b): Topic Interpretation in Determiner and Adverbial Quantification. In: C. Davis, A. R. Deal & Y Zabbal (eds.), *The Proceedings of the 36th Conference of the North Eastern Linguistic Society (NELS 36)*.

von Fintel, K. (1994): Restrictions on Quantifier Domains. PhD thesis, University of Massachusetts, Amherst.

von Fintel, K. (2004): A Minimal Theory of Adverbial Quantification. In: H. Kamp &

B. Partee (eds.), *Context-Dependence in the Analysis of Linguistic Meaning*, 137–175. Oxford: Elsevier.

Fox, D. (2002): Antecedent Contained Deletion and the Copy Theory of Movement. *Linguistic Inquiry* 33, 63-96.

Fukui (1988): Deriving the differences between English and Japanese: A Case Study in Parametric Syntax. *English Linguistics* 5: 249-270.

Graff, D. (2001): Descriptions as Predicates. *Philosophical Studies* 102, 1–42.

Graff, D. (2006): Descriptions with Adverbs of Quantification, draft, Princeton University.

Groenendijk, J. and M. Stokhof (1990): Dynamic Predicate Logic. *Linguistics and Philosophy* 14, 39-100.

Heim, I. (1982): The Semantics of Definite and Indefinite Noun Phrases. PhD thesis, University of Massachusettes, Amherst.

Heim, I. and A. Kratzer (1998): *Semantics in Generative Grammar*. Oxford: Blackwell.

Herburger, E. (2000): *What Counts. Focus and Quantification.* Cambridge, Mass.: MIT Press.

Hinterwimmer, S. (2005): Q-Adverbs as Selective Binders: The Quantificational Variability of Free Relatives and Definite DPs, PhD thesis, Humboldt University Berlin.

Hinterwimmer, S. (to appear): The Interpretaion of Universally Quantified DPs and Singular Definites in Adverbially Quantified Sentences. In: *Proceedings of the 25th West Coast Conference on Formal Linguistics (WCCFL 25)* .

Kamp, H. (1981): A Theory of Truth and Semantic Representation. In: J. Groenendijk, T. Janssen and M. Stokhof (eds.), *Formal Methods in the Study of Language*, 277-322. Mathematisch Centrum, University of Amsterdam, Amsterdam.

Kratzer, A. (1989): An Investigation of the Lumps of Thought. *Linguistics and Philosophy* 12, 607-653.

Kratzer, A. (1995): Stage-Level Predicates and Individual-Level Predicates. In: G. Carlson and F. J. Pelletier (eds), *The Generic Book*, 125-175. Chicago: University of Chicago Press.

Kratzer, A. (2004): Covert Quantifier Restrictions in Natural Languages. Handout of a talk given at the Milan Meeting 'Covert Variables at LF' (Palazzo Feltrinelli, Gargnano).

Krifka, M. (1989): *Nominalreferenz und Zeitkonstitution. Zur Semantik von Massentermen, Pluraltermen und Aspektklassen.* München: Fink.

Krifka, M. (1992): Thematic Relations as Links between Nominal Reference and Temporal Constitution. In: I. Sag and A. Szabolcsi (eds.), *Lexical Matters*, 29-53. Chicago: University of Chicago Press.

Krifka, M. (1995): Focus and the Interpretation of Generic Sentences. In: G. Carlson and F.J. Pelletier (eds.), *The Generic Book*, 238-264. Chicago: University of Chicago Press.

Krifka, M. (2001): Non-Novel Indefinites in Adverbial Quantification. In: C. Condoravdi and G. Renardel de Lavelette (eds.), *Logical Perspectives on Language and Information.* Stanford: CSLI Publications.

Lahiri, U. (2002): *Questions and Answers in Embedded Contexts*. Oxford: Oxford University Press.

Landman, F. (2000): *Events and Plurality*. Dordrecht: Kluwer.

Lasersohn, P. (1995): *Plurality, Conjunction and Events*. Dordrecht: Kluwer.

Lasersohn, P. (1998): Generalized Distributivity Operators. *Linguistics and Philosophy* 21, 83-93.

Lenci, A. and P. M. Bertinetto (1999): Aspect, Adverbs, and Events: Habituality vs. Perfectivity. In: F. Pianesi, J. Higginbotham and A. C. Varzi (eds), *Speaking of Events*, 245-287. Oxford: Oxford University Press.

Link, G. (1983): The Logical Analysis of Plurals and Mass Terms: A Lattice-Theoretical Approach. In: R. Bäuerle, C. Schwarze and A. von Stechow (eds.), *Meaning, Use and Interpretation of Language*, 302-323. Berlin: de Gruyter.

Link, G. (1987): Generalized Quantifiers and Plurals. In: P. Gärdenfors (ed.), *Generalized Quantifiers. Linguistic and Logical Approaches*. Dordrecht: Reidel.

Marti, L. (2003): Contextual Variables. PhD thesis, University of Connecticut, Connecticut.

Nakanishi, K. and M. Romero (2004): Two Constructions with *Most* and their Semantic Properties. In: K. Moulton and M. Wolf (eds.), *Proceedings of NELS 34*. Umass, Amherst: GLSA.

Ogihara, T. (1998): Adverbial Quantifiers, Maximal Situations, and Weak E-type Pronouns. In: *Proceedings of the Western Conference on Linguistics*, (WECOL 96) Volume 9, 200-213. Department of Linguistics, California State University, Fresno.

Parsons, T. (1990): *Events in the Semantics of English*. Cambridge Massachusetts: MIT Press.

Partee, B. (1995): Quantificational Structures and Compositionality. In: A. Kratzer, E. Bach, E. Jelinek and B. Partee (eds), *Quantification in Natural Languages*, 541-602. Dordrecht: Kluwer.

Percus, O. (2000): Constraints on Some Other Variables in Syntax. *Natural Language Semantics* 8, 173–229.

Rooth, M.(1985): Association with Focus. PhD thesis, University of Massachusetts, Amherst.

Rooth, M. (1995): Indefinites, Adverbs of Quantification and Focus Semantics. In: G. Carlson and F. J. Pelletier (eds), *The Generic Book*, 265-299. Chicago: University of Chicago Press.

Schein, B. (1993): *Plurals and Events*. Cambridge Massachusetts: MIT Press.

Selkirk, E. (1995): Sentence Prosody: Intonation, Stress, and Phrasing. In: J. A. Goldsmith (ed.), *The Handbook of Phonological Theory*, 550–569. London: Blackwell.

Sharvy, R. (1980): A More General Theory of Definite Descriptions. *The Philosophical Review* 89, 607-624.

Sportiche (1988): A Theory of Floating Quantifiers and its Corollaries for Constituent Structure. *Linguistic Inquiry* 19: 425-449.

Stanley, J. (2000): Context and Logical Form. *Linguistics and Philosophy* 23, 391-434.

Staudacher, P: (1987): Zur Semantik indefiniter Nominalphrasen. In: B. Asbach-Schnitker & J. Roggenhofer (eds.), *Neuere Forschungen zur Wortbildung und Historiographie in der Linguistik.* Tübingen: Narr Verlag.

de Swart, H. (1993): *Adverbs of Quantification: A Generalized Quantifier Approach*. New York: Garland.

Zimmermann, M. (2003): Pluractionality and Complex Quantifier Formation. *Natural Language Semantics* 11, 249-287.

Cornelia Endriss
University of Potsdam
SFB 632 „Information Structure“
Postfach 601553
14415 Potsdam
Germany
endriss@rz.uni-potsdam.de

Stefan Hinterwimmer
Humboldt University of Berlin
SFB 632 “Information Structure”
Mohrenstr. 40/41
Unter den Linden 6
10099 Berlin
Germany
stefan.hinterwimmer@rz.hu-berlin.de