# The Non-Uniformity of Quantificational Variability Effects:
## A Comparison of Singular Indefinites, Bare Plurals and Plural Definites

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**Abstract**

In our article, we discuss three different kinds of quantificational variability effects, namely quantificational variability readings in adverbially quantified sentences with (a) singular indefinites, (b) bare plurals and (c) non-kind denoting plural definites. We investigate the three different strategies that are needed to derive the different kinds of quantificational variability effects. It is argued that all cases have the same quantificational domain, i.e. they all involve quantification over eventualities. We also show that the availability of quantificational variability effects in sentences with singular indefinites and plural definites is restricted by a constraint that we call the *tense agreement constraint*. Interestingly, there is no such restriction for sentences with bare plurals. This difference is due to the fact that singular indefinites and plural definites interact with the denotations of Q-adverbs in another way than bare plurals: while the former can be interpreted directly in the restriction of a Q-adverb, the latter need to be type-shifted in order to be interpretable in this position. This 'indirect interpretation' of bare plurals is assumed to be responsible for their resistance against the *tense agreement constraint*. This in turn is the reason why they induce quantificational variability effects in a wider range of cases than their singular indefinite or plural definite counterparts.

# 1. Introduction[*]

Adverbially quantified sentences that contain singular indefinites or bare plurals are often intuitively equivalent to sentences not containing a quantificational adverb (Q-adverb), but which have a corresponding quantificational DP in argument position instead (see Lewis 1975, Kamp 1981, Heim 1982, Berman 1987, Diesing 1990, de Swart 1993, von Fintel 1994, Chierchia 1995, Krifka 1995, Rooth 1995, Herburger 2000 and Krifka 2001 among others). This phenomenon is generally referred to as *Quantificational Variability Effect* (henceforth: QVE; Berman 1987), because the quantificational force of the respective singular indefinite or bare plural seems to depend on the quantificational force of the respective Q-adverb.

(1)     a. A cat is usually smart.
          b. Most cats are smart.
          c. A cat is always smart.
          d. All cats are smart.

(2)     a. Dogs are usually stupid.
          b. Most dogs are stupid.

c. Dogs are always stupid.
d. All dogs are stupid.

(1a) is thus equivalent to (1b), (1c) is equivalent to (1d), (2a) is equivalent to (2b), and (2c) is equivalent to (2d).

Our first goal is to show that QVEs always involve quantification over events, but that there is nevertheless an important difference between sentences containing singular indefinites and those containing bare plurals. We will see that the availability of quantificational variability (QV)-readings is more constrained with singular indefinites than with bare plurals. This difference is due to the fact that singular indefinites and bare plurals interact differently with the denotation of Q-adverbs: while the former can be interpreted directly in the restriction of Q-adverbs, the latter need to be type-shifted in order to be interpretable in this position (see Carlson 1977, Chierchia 1998 and Dayal 2004 for the view that bare plurals need to be type-shifted in order to be interpretable in sentences containing object-level predicates).

Our second goal is to show that QVEs also occur in sentences containing (non-kind denoting) plural definites, and that adverbially quantified sentences with plural definites are constrained in the same way as sentences with singular indefinites. On the one hand, we argue that bare plurals and plural definites have similar denotations insofar as they both denote maximal sum individuals (building on Chierchia 1998 and Dayal 2004). On the other hand, we assume that there is a difference in the internal constitution of those sum individuals, which is responsible for the fact that the former need to be type-shifted if they are the arguments of object-level predicates, while in the latter case such a type shift is not necessary. As we will see, the availability/unavailability of this type-shift is the key to an explanation of the different behaviour of bare plurals and plural definites with respect to QVEs.


## 2. The basic facts

*2.1 Singular indefinites*

Endriss and Hinterwimmer (to appear) discuss the following observation: adverbially quantified sentences that contain singular indefinites modified by relative clauses fail to show QVEs if the tense marking of the respective matrix verb does not agree with the tense marking of the relative clause verb. In the following, we will refer to this as the *tense agreement constraint*. No comparable constraint can be observed in sentences containing quantificational DPs modified by relative clauses.

(3)    a. [??]A car that was bought in the eighties is usually blue.
    b. A car that was bought in the eighties was usually blue.
    c. Most cars that were bought in the eighties are blue.
    d. Most cars that were bought in the eighties were blue.

(3a), where the relative verb is marked for past tense, while the matrix verb is marked for present tense, does not receive a QV-reading. Rather, it can only be interpreted as saying that there is a specific car which was bought in the eighties such that this car is blue in most relevant events. As it is rather odd (at least in the absence of a special context) to assume that cars constantly change their colour, (3a) is very strange. (3b), on the other hand, where both verbs are marked for past tense, receives a QV-reading easily, and has (roughly) the same meaning as (3c)[1].

The examples in (3c) and (3d) show that the tense agreement constraint is specific to adverbial quantification, as there is no contrast in acceptability between the two sentences. They rather differ in interpretation: While (3c) implies that the cars quantified over still exist at the speech time (at least in their majority), (3d) strongly implicates that they (or at least a large majority of them) do not exist anymore at the speech time (cf. Kratzer 1995 and Musan 1997, who discuss similar effects under the label *lifetime effects*[2]).

As discussed in detail in Endriss and Hinterwimmer (to appear), the tense agreement constraint does not always hold. If, for example, the relative clause internal verb is a verb of creation or a verb of coming into existence, the respective sentences receive QV-readings easily, even if the tenses of matrix and relative clause do not agree:[3]

(4)    a. A car that was built in the eighties is usually blue.
       b. An elephant that was born in the eighties is usually brave.

## 2.2 Bare plurals

Surprisingly, the tense agreement constraint does not seem to be in effect in adverbially quantified sentences containing bare plurals.

(5)    a. Cars that were bought in the eighties are usually blue.
       b. Cars that were bought in the eighties were usually blue.

(5a) only differs from (3a) insofar as the singular indefinite has been replaced by a bare plural. Nevertheless, it is grammatical and receives a QV-reading as easily as (5b), the only difference being that (5b) in contrast to (5a) shows a lifetime effect, i.e. it implicates that either at least a majority of the cars that were bought in the eighties do not exist anymore or, alternatively, that they have changed their colour, and are not blue anymore at the speech time.

## 2.3 Plural definites

Languages like English sometimes allow for QV-readings of sentences containing plural definites[4] even though these plural definites cannot be used for kind reference – other than in Italian and German (see Krifka et al. 1995, Chierchia 1998, Longobardi 2001, Dayal 2004, Krifka 2004). (6a) can intuitively be paraphrased as in (6b), and (6c) can be paraphrased as in (6d).

(6)    a.  The people that lectured on kangaroos at the conference last summer were usually open-minded.
       b.  Most people that lectured on kangaroos at the conference last summer were open-minded.
       c.  The lions Peter saw during his safari usually had a mane.
       d.  Most lions that Peter saw during his safari had a mane.

Note, however, that plural definites pattern with singular indefinites, not with bare plurals, as far as tense agreement is concerned. If the verbs in (6a) and (6c) are set to present tense, the resulting sentences become unacceptable.[5]

(7)    a. ??The people that lectured on kangaroos at the conference last summer are usually open-minded.

b. [??]The lions Peter saw during his safari usually have a mane.


# 3. QVEs in sentences containing singular indefinites

*3.1 Unselective binding approaches*

According to Heim 1982, who builds on Lewis 1975 (see also Kamp 1981, Diesing 1990 and Kratzer 1995), Q-adverbs are unselective binders, capable of binding any free variable they have scope over at LF, no matter if it is a situation/event variable or an individual variable. Singular indefinites are not analyzed as existentially quantified DPs, but as open expressions that introduce free, predicatively restricted individual variables. This has the consequence that a sentence like (1a) (repeated below as (8a)) is interpreted as in (8b):

(8)　　a. A cat is usually smart.
　　　　b. $Most_x$ [cat(x)] [smart(x)]

Obviously, these approaches are unable to account for the already mentioned difference between adverbially quantified sentences containing singular indefinites and sentences containing quantificational DPs. According to these theories, there is no difference between sentences like (3a) (repeated below as (9a)) and (3c) (repeated below as (9b)) at the level of semantic interpretation. Both are interpreted as is shown in (9c).

(9)　　a. [??]A car that was bought in the eighties is usually blue.
　　　　b. Most cars that were bought in the eighties are blue.
　　　　c. $Most_x$ [car(x) $\wedge$ bought_in_80s(x)] [blue(x)]

*3.2 Event/situation semantics approaches*

Glossing over some differences, the approaches by Berman 1987, de Swart 1993, and Herburger 2000[6] all share the following assumptions:

  – Q-adverbs exclusively quantify over (sets of) situations/eventualities.[7]
  – Restrictor and nucleus are determined on the basis of information structure. The denotation of the whole clause minus the Q-adverb is mapped onto the nuclear scope, while the denotation of the non-focal/topical constituents is mapped onto the restriction.
  – Indefinites are interpreted as existentially quantified DPs.
  – There is no difference between stage-level and individual-level predicates with respect to the introduction of situation/eventuality variables.

QVEs then come about in the following way: If an indefinite is not focus-marked (i. e. un-accented), its denotation is mapped onto the restriction of a Q-adverb. Furthermore, the value assigned to the individual variable bound by the existential quantifier is assumed to vary with the value assigned to the situation/event variable bound by the Q-adverb.
　　　　Adopting a neo-Davidsonian approach (see Parsons 1990, Schein 1993, Herburger 2000 and Landman 2000), verbs are interpreted as monadic predicates of eventualities. The individual arguments of those verbs are taken to be the arguments of thematic role predicates that are added conjunctively to the respective verbal predicate. Under these assumptions, the combination of the factors listed above enables a sentence like (1a) (repeated below as (10a)) to be interpreted as in (10b) or – equivalently – (10c),[8] if the indefinite DP is assumed to be non-focussed.

(10)  a. A cat is usually smart.
　　　b. $Most_e$ [∃x [cat(x) ∧ Arg(e, x)]]  [∃x [cat(x) ∧ Arg(e, x) ∧ smart(e)]]
　　　c. $Most_e$ [∃x [cat(x) ∧ Arg(e, x)]] [smart(e)]

In the following we assume the (somewhat simplified) tense semantics given in (11) below for present and past tense, according to which tense information is interpreted as an additional condition on the eventuality variables introduced by the respective verbs.

(11)  a. pres(e) := $t_0 \subseteq \tau(e)$
　　　b. past(e) := $\tau(e) < t_0$,
　　　　　where $\tau(e)$ is the function that maps an eventuality $e$ to its running time
　　　　　(see Krifka 1989), and $t_0$ is the speech time.

These approaches also predict that a sentence like (3a) (repeated below as (12a)) receives a well-formed semantic representation such as the one given in (12b). There is no obvious reason why the lack of agreement between the tense marking of the relative clause verb and the tense marking of the matrix verb should cause any harm. After all, the Q-adverb binds the eventuality variable introduced by the matrix verb, not the eventuality variable introduced by the relative clause verb.

(12)  a. [??]A car that was bought in the 80s is usually blue.
　　　b. $Most_e$ [∃x [ car(x) ∧ Arg(e, x) ∧ [∃e'. buy(e') ∧ Theme(e', x)
　　　　　∧ $\tau(e') \subseteq$ 80s ∧ $\tau(e') < t_0$]] [blue(e) ∧ $t_0 \subseteq \tau(e)$]

This means that without further assumptions, also the situation/event semantics approaches cannot explain the observed contrast. Nevertheless, it seems obvious that an event semantics approach like the one described above has the potential to be modified in such a way that it can account for the fact that the availability of QV-readings depends on tense agreement.

*3.3 The Interval resolution strategy*

It is often assumed that adverbial as well as determiner quantifiers come with a covert domain restriction in the form of a free context variable *C* ranging over predicates (cf. von Fintel 1994, Stanley 2000, Marti 2003). This variable is assumed to be added conjunctively to the overtly given predicate that functions as the first argument of the respective quantifier. As eventualities – being spatio-temporal entities – need to be located in time (Partee 1973, Lenci and Bertinetto 1999), we assume that the context variable introduced in the restriction of a Q-adverb needs to be resolved to the predicate given in (13). The purpose of this predicate is to locate the respective eventuality in a time interval *i*, which is initially given in the form of a free variable. The value of this variable then needs to be determined on the basis of contextual information.

(13)  λe. $\tau(e) \subseteq i_e$,
　　　where $i_e$ denotes a time interval.[9]

According to the above assumptions, the initial semantic representation of sentence (3a) is as in (14b) below:

(14)  a. [??]A car that was bought in the eighties is usually blue.
　　　b. $Most_e$ [∃x [car(x) ∧ Arg(e, x) ∧ ∃e'[buy(e') ∧ Theme(e', x) ∧ $\tau(e') < t_0$
　　　　　∧ $\tau(e') \subseteq$ 80s] ∧ $\tau(e) \subseteq i_e$]] [blue(e) ∧ $t_0 \subseteq \tau(e)$]

The next step consists in determining a value for the free interval variable $i_e$. We assume that this is done according to the pragmatic *interval resolution strategy* (IRS; see Endriss and Hinterwimmer to appear for details).

(15) 1. Make use of direct, overt information. (Note: the intervals denoted by temporal adverbials that modify the respective matrix verb count as *direct, overt information*).
2. If not available: make use of locally available indirect information, i.e. take (the most specific) contextual information originating from the same domain. (Note: the restrictor of an adverbial quantifier counts as one domain, and the nuclear scope of an adverbial quantifier as the other domain, where these notions are meant to apply at the level of semantic interpretation exclusively).
3. If not available: take either contextual information from the other domain, or the default interval $t_{world}$, which denotes the whole time axis.

The principle behind this strategy is the following: Direct information is to be preferred over indirect one, and local information is to be preferred over less local one.

Now in the case of (3a), step 1. is not applicable: there is no temporal adverbial restricting the eventuality variable $e$ introduced by the matrix verb[10]. However, the relative clause introduces a contextually salient eventuality within the same domain (i.e. the *restrictor*), namely the buying event *e'*. Therefore, step 2. can (and must) be taken, and $i_e$ is resolved to the running time $\tau(e')$ of the respective buying event. The final semantic representation of (3a) is thus the one given in (16b) below[11]:

(16)  a. [??]A car that was bought in the eighties is usually blue.
      b. $\text{Most}_e$ [$\exists x$ [car(x) $\land$ Arg(e, x) $\land$ $\exists e'$[buy(e') $\land$ Theme(e', x) $\land$ $\tau(e') < t_0$
         $\land$ $\underline{\tau(e') \subset 80s}$] $\land$ $\underline{\tau(e) \subset \tau(e')}$]] [blue(e) $\land$ $\underline{t_0 \subset \tau(e)}$]

It is now easy to see that the tense specification in the restrictor contradicts the one in the nucleus. According to the restrictor, the eventualities quantified over have to be located within *the eighties* (as they are set to the running times of the respective buying events that took place during the eighties). On the other hand, according to the tense marking of the matrix verb, which is interpreted in the nucleus, the very same eventualities have to include the speech time. But this has the consequence that the intersection between restrictor and nucleus is necessarily empty. We assume that this is the reason why (3a) does not receive a QV-reading, but only a specific reading according to which the indefinite DP takes scope over the Q-adverb. As this reading is out for the reason already indicated in section 2.1, (3a) is odd.

Let us now turn to sentence (3b) (repeated below as (17a)): If we follow the same principles that lead to a contradiction in the case of (3a), (3b) receives the perfectly coherent interpretation given in (17b).

(17)  a. A car that was bought in the eighties was usually blue.
      b. $\text{Most}_e$ [$\exists x$ [car(x) $\land$ Arg(e, x) $\land$ $\exists e'$[buy(e') $\land$ Theme(e', x) $\land$ $\tau(e') < t_0$
         $\land$ $\underline{\tau(e') \subset 80s}$] $\land$ $\underline{\tau(e) \subset \tau(e')}$]] [blue(e) $\land$ $\underline{\tau(e) < t_0}$]

In this case, the information contributed by the past tense marking of the matrix verb does not clash with the tense specification in the restrictor. For this reason, (3b) receives a QV-reading.

Let us finally turn to the cases already mentioned in section 2.1, where a QV-reading is available in spite of the fact that the tense marking of the relative clause verb does not agree with the tense marking of the matrix verb (see Endriss and Hinterwimmer to appear for

details). In sentences such as (18), the relevant factor seems to be that the respective matrix verb is a verb of creation or coming into existence.

> (18)    a. A car that was built in the eighties is usually blue.
>         b. An elephant that was born in the eighties is usually brave.

We assume that in such cases the IRS – which is a pragmatic strategy, and therefore can be cancelled if there is a good reason to do so –  does not apply, and $i_e$ 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 sentences would have the consequence that those minimal variants of (18a, b) could only be true if the individuals contained within the eventualities quantified over were already in the state denoted by the matrix verbs *before* they came into existence, i.e. before the respective relative clause events were completed. In other words, in contrast to the case of (3a) vs. (3b) there is no way to (minimally) alter those sentences in such a way that the resulting semantic representations conform to the IRS and have non-absurd truth conditions at the same time. This is due to the following reason: If the IRS was applied to a minimal variant of (18a), i.e. one where the matrix verb is set to past tense, the eventualities quantified over would be located within the running times of the respective building events. This would have the consequence that this sentence could only be true if the cars contained within the eventualities quantified over were already blue before they came into existence – which is of course absurd (and similarly for (18b)).[12] We assume that this is reason enough for the IRS (which is just a pragmatic strategy) to be cancelled in cases like the ones above. This has the consequence that $i_e$ is set to the default time interval $t_{world}$. As a consequence of this move, sentences like the ones in (18) receive non-contradictory QV-readings in spite of the non-agreeing tense markings.

This concludes our review of the explanation given in Endriss and Hinterwimmer to appear for the tense agreement constraint observed in adverbially quantified sentences containing indefinites. In sections 4 and 5, we turn to the behaviour of bare plurals and plural definites in adverbially quantified sentences, respectively.

## 4. QVEs in sentences containing bare plurals

*4.1 The phenomena*

As already mentioned in section 2.2, a lack of tense agreement does not seem to preclude adverbially quantified sentences containing bare plurals from having QV-readings. This is evidenced by the fact that sentence (5a) (repeated below as (19a)), which is a minimal variant of (3a), receives a QV-reading as easily as sentence (3b) (repeated below as (19b)), the only difference being that the second one induces a lifetime effect.

> (19)    a. Cars that were bought in the eighties are usually blue.
>         b. Cars that were bought in the eighties were usually blue.

Before we can offer an account for this surprising difference between singular indefinites and bare plurals, which are often grouped together when QVEs are discussed, we have to discuss the possible denotations of  bare plurals.

*4.2 The basic denotation of bare plurals*

There are two different kinds of approaches to the meaning of bare plurals: According to the first one (see Carlson 1977), bare plurals unambiguously denote kinds, while they are

ambiguous according to the second one (see Wilkinson 1991 and Gerstner-Link & Krifka 1993), either referring to kinds, or denoting plural indefinites.

*4.2.1 Bare plurals as kind denoting expressions*

Carlson 1977 assumes that bare plurals unambiguously denote kinds, where kinds are taken to be individuals of a special sort. The main observation on which this approach is based is the following: Bare plurals (at least the ones that contain unmodified nouns; but see below) can serve as arguments of predicates like *die out*, *be extinct*, *be widespread (in this area)*, etc., which have been termed *kind level predicates* by Carlson (ibd.) because they denote properties that can only be ascribed to kinds but not to concrete objects.

>   (20)  a. The elephant will become extinct soon.
>         b. Elephants will become extinct soon.
>         c. *Chang will become extinct soon.
>         d. *An elephant will become extinct soon (non-taxonomic reading).

The fact that both (20a) and (20b) are acceptable shows that singular definites as well as bare plurals can denote kinds in English,[13] while the unacceptability of (20c) and (20d) is a clear indication that neither (ordinary) proper names nor singular indefinites can be used for kind-reference.

In order to explain the well-known fact that bare plurals are interpreted existentially if they serve as the arguments of object-level predicates (in episodic sentences), Carlson 1977 assumes that if an object-level predicate has a kind denoting term as argument, this predicate is type-shifted in the following way: It is interpreted as a predicate that maps kinds to truth values if the original object-level predicate holds of an instantiation of this kind. In order to see how this works, consider the semantic representation of (21a) in (21) below (from Krifka 2004: 1), where *R(a,b)* stands for '*a realizes b/ a is an instantiation of b*'.

>   (21)  a. Potatoes rolled out of the bag.
>         b. $\lambda x \exists y[R(y, x) \wedge$ rolled_out_of_the_bag$(y)]$ (potatoes_kind)
>            $= \exists y[R(y,$ potatoes_kind$) \wedge$ rolled_out_of_the_bag$(y)]$

A further argument for analyzing bare plurals as kind denoting terms is the fact that bare plurals in contrast to singular indefinites may only take narrow scope with respect to other operators.

>   (22)  a. John didn't see a dog.
>         b. $\exists x[$dog$(x) \wedge \neg$saw$(x,$ John$)]$
>         c. $\neg \exists x[$dog$(x) \wedge$ saw$(x,$ John$)]$
>         d. John didn't see dogs.
>         e. $\neg \exists y[R(y,$ dogs_kind$) \wedge$ saw$(y,$ John$)]$

Whereas (22a) is ambiguous between the reading given in (22b) and the one given in (22c), (22d) only allows the reading in (22e), i.e. it is only true if there are no dogs that John saw. This contrast is easily explained under the assumption that in the case of bare plurals, the existential quantifier is introduced by the lexical predicate, whereas indefinites denote generalized quantifiers with existential force and may therefore be quantifier raised at LF.

Recently, the approach of Carlson 1977 has been revived by Chierchia 1998 (see also Dayal 2004), who argues for what he calls a "Neo-Carlsonian approach". Chierchia 1998 also takes bare plurals (in argument position) to be kind denoting terms, but disagrees with Carlson

insofar as he assumes that kinds (in English)[14] are derived from properties. More specifically, he assumes that bare plurals (in English, see fn. 14) basically denote objects of type $<s, <e, t>>$ (where $s$ is the type of possible worlds/situations), and have to be shifted to objects of type $<s, e>$ if they occur in argument position via a nominalization operation ('down') that is defined as follows:

$$(23) \quad \cap: \lambda P_{<s <e, t>>} \lambda s \; \iota x[P(x)(s)],$$

Note that the ι-operator is defined as in Sharvy 1980 (see also Link 1983), i.e. as the operator which picks out the maximal element of a set with regard to the number of atoms. It is assumed that objects of type $e$ may not only be atomic individuals, but also sum individuals (see Sharvy 1980 and Link 1983 for details).

The $\cap$-operator is thus defined as a function from properties to a function from worlds/situations to the maximal entity that satisfies that property in that world/situation. It can therefore be seen as the intensional counterpart of the definite article – a point to which we will return in section 5.1. Note, however, that Chierchia 1998 assumes that shifting via the $\cap$-operator is only possible if the respective property is general enough to have a non-empty, non-singleton extension in a sufficient number of possible worlds. Otherwise, the result of the application of the $\cap$-operator is not defined. According to this view, bare plurals in argument position denote (functions that generate) sum individuals that consist not only of the individuals that satisfy the respective NP-predicate in the actual world, but also of those that satisfy this predicate in other possible worlds.

At this point, Chierchia 1998 follows Carlson 1977 insofar as he assumes that the objects created by the $\cap$-operator can only serve as arguments of kind-level predicates like *be extinct*, etc., whereas a further type shift has to apply in order to make them compatible with object level predicates. Only the former take arguments of type $<s, e>$, while the latter take arguments of type $e$. He calls this type shifting operation *Derived Kind Predication (DKP)* and defines it as in (24a) below. Note that DKP draws on the predicativizer operation $\cup$ ('up'), which is the inverse of $\cap$. It takes kinds and maps them to their instantiation sets in a (contextually) given world/situation (see (24b) below). The DKP-rule has the same effect as the type shifting operation assumed by Carlson 1977. It triggers existential quantification over instantiations of a given kind.

(24)    a. DKP:  If *P* applies to objects, and *k* denotes a kind, then *P(k)* =
                 $\exists x \; [^{\cup}k(x) \wedge P(x)]$
        b. $\cup$: $\lambda k_{<s,e>} \lambda x[x \leq k(s')]$,
             where *s'* is a contextually salient world/situation.

Therefore, according to Chierchia 1998, a sentence like (25a) below is interpreted as shown in (25b), whereas a sentence like (25c) is interpreted as shown in (25d):

(25)    a. Dogs are extinct.
        b. Extinct ($^{\cap}$DOGS).
        c. Dogs didn't bark.
        d. $\neg\exists x[^{\cup\cap}$DOGS(x) $\wedge$ bark(x)]

*4.2.2 The ambiguity approach*

According to the second approach, which goes back to Wilkinson 1991 and Gerstner-Link and Krifka 1993, bare plurals are systematically ambiguous. They either refer to kinds, or are

the plural counterparts of singular indefinites. A refined version of this ambiguity approach, which incorporates many assumptions from Chierchia 1998, has recently been proposed by Krifka 2004: Krifka assumes that bare plurals basically denote properties, but that they can either be shifted to objects that correspond to plural indefinites or to objects that correspond to kinds, the choice between the two options being dependent on the local context.

According to Krifka 2004, count nouns take an additional number argument that can be filled overtly by a number word. Alternatively, there is also the option of combining the denotation of a count noun with semantic number, which results in the creation of a new property – namely the property of being an object of unspecified cardinality that satisfies the respective predicate. Thus, the bare plural *dogs* denotes the object given in (26) below:

(26)    $\lambda s\lambda x\exists n[dog(s, n, x)]$

Krifka assumes that if a bare plural is combined with an object-level predicate, the property denoted by this bare plural has to be shifted to an existential quantifier to resolve the mismatch. Consider the example in (27a) below (from Krifka 2004), which is interpreted as in (27b) after existential type shift has applied to the bare plural *dogs*.

(27)    a. Dogs are barking.
        b. $\lambda s\exists x[\exists n[dog(s)(n)(x) \wedge be\_barking(s)(x)]$

If, on the other hand, a bare plural is combined with a kind level predicate, Krifka assumes that it is shifted to the corresponding kind via the $^{\cap}$-operator. A sentence like (28a) below is thus interpreted as in (28b):

(28)    a. Dogs are extinct.
        b. $\lambda s [be\_extinct(s) (\lambda s'[\iota x \exists n[dog(s')(n)(x)]])]$

As Krifka assumes that the respective type shifting operations have to apply locally, i.e. at that point in the derivation where the mismatch occurs, the fact that bare plurals take narrow scope is also accounted for.

Let us now return to the question how the absence of tense agreement effects in adverbially quantified sentences containing bare plurals can be explained.


*4.3 The absence of tense agreement effects with bare plurals*

*4.3.1 The potential of the ambiguity approach*

Let us first see whether the ambiguity approach by Krifka 2004 has the potential to explain this difference between singular indefinites and bare plurals. It has been shown above that sentence (5a) (repeated here as (29)) is perfectly grammatical despite the non-agreement in tense of the matrix and relative clause, while its counterpart (3a) with the singular indefinite in argument position is unacceptable.

(29)    Cars that were bought in the eighties are usually blue.

Let us stick to the assumption that Q-adverbs unambiguously quantify over eventualities (as argued for in the last section). As in a sentence like (29) above the bare plural c*ars that were bought in the eighties* serves as the argument of the object level predicate *blue*, it would have to be shifted via the existential type shifting operation. But this would have the consequence

that after the mapping algorithm has applied, the object that is interpreted in the restrictor of *usually* is almost identical to the one denoted by the corresponding singular indefinite. The only difference between the two is that in the case of the singular indefinite, quantification is restricted to objects of cardinality 1, while in the case of the bare plural the cardinality remains unspecified (see Krifka 2004 for details). But then there is no reason why the interval resolution strategy should not apply in the same way as it did in the case of (3a), i.e. why the eventualities quantified over should not be set to the running times of the respective buying events, which would result in the contradiction discussed in section 3.3. The acceptability difference between (3a) and (29) could thus not be explained.

### 4.3.2 The potential of the Neo-Carlsonian approach

In this section we will see that the Neo-Carlsonian approach proposed by Chierchia 1998 indeed has the potential to explain the observed contrast between singular indefinites and bare plurals. Let us again stick to the assumption that Q-adverbs are only able to quantify over eventualities.[15]

There is a subtle contrast between the ambiguity approach discussed in the previous section, and the approach of Chierchia 1998. While in the first one, singular indefinites and bare plurals are indeed indistinguishable after the existential type shift has applied, this does not hold true for the second one. In the case of singular indefinites, individuals that satisfy a certain property are involved, whereas in the case of bare plurals, we are dealing with individuals that have the property of being instantiations of a certain kind (see the definitions in (24) above).

This is an important difference if the respective expressions are interpreted in the restrictor of a Q-adverb. In the case of a singular indefinite, the predicate denoted by the NP-complement of the indefinite determiner is interpreted directly in the restrictor, and therefore counts as accessible information, as far as the interval resolution strategy is concerned. Concerning bare plurals, on the other hand, it makes sense to assume that the property which serves as the "basis" of the respective kind before application of the DKP does no longer count as accessible information. We tentatively assume that this is due to the fact that the relation between this property and the objects that are actually contained within the eventualities quantified over is more indirect in this case than it is in the case of singular indefinites: While in the latter case the Q-adverb quantifies over eventualities each of which contains an individual that satisfies a certain property, in the former case the Q-adverb quantifies over eventualities each of which contains an individual that has the property of instantiating a kind that has been generated on the basis of this property.[16] We claim that this has the effect that in the case of a bare plural modified by a relative clause, the free interval variable $i_e$ cannot be resolved to the running times of the respective relative clause events, but rather needs to be resolved to the default value $t_{world}$. In other words, because the running time of the respective relative clause eventuality does not count as accessible local information in the case of bare plurals that are mapped onto the restrictor of Q-adverbs (due to the fact that those bare plurals have to be type-shifted in order to be interpretable in this position), step 2. of the IRS cannot be applied, which has the consequence that $i_e$ has to be resolved to $t_{world}$ (according to step 3).

Consider the semantic representation of sentence (29) (repeated below as (30a)) given in (30b), and compare it to the (ill-formed) semantic representation of sentence (3a) (repeated below as (30c)) given in (30d): In (30b) there is no clash between the temporal information in the restrictor and the one in the nucleus, while in (30d) there is such a clash.

(30)    a. Cars that were bought in the eighties are usually blue.
        b. Most$_e$ [∃x [$^{∪∩}$CARS_THAT_WERE_BOUGHT_IN_THE_EIGHTIES(x)

$$\wedge \text{Arg}(e, x) \wedge \tau(e) \subseteq t_{world}]] \ [\text{blue}(e) \wedge t_0 \subseteq \tau(e)]$$

c.[??]A car that was bought in the eighties is usually blue.

d. $\text{Most}_e \ [\exists x \ [\text{car}(x) \wedge \text{Arg}(e, x) \wedge \exists e'[\text{buy}(e') \wedge \text{Theme}(e' \ x) \wedge \tau(e') < t_0$
$\wedge \underline{\tau(e') \subseteq 80s]} \wedge \underline{\tau(e) \subseteq \tau(e')}]] \ [\text{blue}(e) \wedge \underline{t_0 \subseteq \tau(e)}]$

Note furthermore that this analysis of QVEs in sentences with bare plurals also offers a natural explanation for the life time effect mentioned in Section 4.1. Recall that sentence (19b) (repeated below as (31a)) strongly implicates that either the majority of cars that were bought in the eighties does not exist anymore, or that the majority of these cars has changed its colour. This can be easily explained if it is interpreted as in (31b) below.

(31)  a. Cars that were bought in the eighties were usually blue.

b. $\text{Most}_e \ [\exists x \ [^{\cup\cap}\text{CARS\_THAT\_WERE\_BOUGHT\_IN\_THE\_EIGHTIES}(x)$
$\wedge \text{Arg}(e, x) \wedge \tau(e) \subseteq t_{world}]] \ [\text{blue}(e) \wedge \tau(e) < t_0]$

According to (31b), (31a) is true if most eventualities that contain an instantiation of the kind *cars that were bought in the eighties* and that are furthermore located *somewhere within $t_{world}$* (i.e. within an eventuality that reaches into the past as well as into the future) are also included in the set of *past* eventualities of being blue. This, however, can only be the case if either the majority of those cars does not exist anymore at the speech time, or if they have changed their colour . Otherwise, there would be no reason why the majority of eventualities that include an instantiation of this kind are eventualities of being blue that end before the speech time.[17]

In this section we have offered an explanation for the absence of tense agreement effects in adverbially quantified sentences with bare plurals that is based on the assumption that bare plurals basically denote kinds. In section 5 we will discuss QVEs in adverbially quantified sentences containing plural definites.

# 5. QVEs in sentences that contain plural definites

*5.1 The basic facts repeated*

Recall from Section 2.3 that not only sentences containing singular indefinites or bare plurals, but also sentences containing plural definites sometimes have QV-readings. This is evidenced by the fact that sentence (32a) can be paraphrased as (32b), while sentence (32c) can be paraphrased as (32d):

(32)  a.  The people that lectured on kangaroos at the conference last summer were usually open-minded.
b.  Most people that lectured on kangaroos at the conference last summer were open-minded.
c.  The lions Peter saw during his safari usually had a mane.
d.  Most lions that Peter saw during his safari had a mane.

Furthermore, we noted in Section 2.3 that plural definites pattern with singular indefinites, not with bare plurals, as far as tense agreement is concerned. We will now develop an analysis that is able to explain the existence of QVEs in those sentences and that can also account for the tense agreement restriction already familiar from singular indefinites. The Neo-Carlsonian approach that our analysis of QVEs in sentences with bare plurals is based on assumes that the $^\cap$-operator is nothing but the intensional counterpart of the meaning that is often assumed

for the definite determiner. This makes it necessary to clarify the relation between bare plurals and plural definites.


*5.2 The relation between bare plurals and plural definites*

Interestingly, if the plural definites in (32a) and (32c) are replaced by bare plurals, the resulting sentences sound odd.

    (33)    a. <sup>??</sup>People that lectured on kangaroos at the conference last summer were usually open-minded.
            b. <sup>??</sup>Lions that Peter saw during his safari usually had a mane.

Conversely, if the bare plural in (29) is replaced by a plural definite, the result is likewise odd:

    (34)    <sup>??</sup>The cars that were bought in the eighties are usually blue.

As has been shown in section 2.3, example (7), the oddity of (34) could be due to a violation of the tense agreement constraint, which holds for plural definites, but not for bare plurals. But (35) – the tense agreeing variant of (34) – is still odd.

    (35)    <sup>??</sup>The cars that were bought in the eighties were usually blue.

Obviously, the degree of temporal specificity of the respective relative clause events plays a role here. This can be captured by the following descriptive generalization: If the set of individuals denoted by an NP refers to an eventuality such that the atomic parts of this eventuality are distributed along a rather short time interval, the respective set of individuals must be shifted to the maximal sum individual within this set via (the operator denoted by) the definite determiner. If, on the other hand, the set of individuals denoted by an NP refers to an eventuality such that the atomic parts of this eventuality are distributed along a rather large time interval, the respective set of individuals must be shifted to the maximal sum individual within this set via the $\cap$-operator.

        Recall from Section 4.2.1 that the $\cap$-operator is defined as the function that maps a property to a function from worlds/situations to the maximal entity that satisfies that property in that world/situation (see the formal definition repeated in (36a) below). The definite determiner, on the other hand, is defined as the function that maps a property to the maximal entity that satisfies that property in a contextually salient world/situation (which is given below in the form of the free variable $s_1$, where this variable needs to be resolved on the basis of contextual information.)

    (36)    a. $\cap$: $\lambda P_{<s\,<e,\,t>>}\,\lambda s\ \iota x[P(s)\,(x)]$,
            b. $[[the]] = \lambda P_{<s\,<e,\,t>>}\,\iota x[P(s_1)(x)]$,
                where *s'* is a contextually salient world/situation.

Let us now turn to the question why the application of the respective operators should be restricted in the way suggested above, i.e. why "temporally specific" properties can only be mapped to the maximal sum individual that satisfies the respective property in a contextually salient world/situation, while "temporally non-specific" properties can only be mapped to functions from possible worlds/situations to the maximal sum individuals that satisfy the respective property in that world/situation.[18]

Temporally specific properties like *being a plurality of lions that Peter saw during his safari* or *being a plurality of persons that lectured on kangaroos at the conference last summer*, which contain an indexical element or a rigid designator, obviously only have an extension in a very small number of situations that are part of the actual world (or, in fictional contexts, in some other salient world). According to Chierchia 1998, shifting via the $\cap$-operator is only possible if the respective property is general enough to have a non-empty, non-singleton extension in a sufficient number of possible worlds/situations. Otherwise, the result of the application of the $\cap$-operator is not defined. This immediately answers the question why NPs denoting temporally specific properties can only be shifted via the (denotation of the) definite determiner. Let us furthermore assume that in these cases the contextual world/situation variables $s_1$ introduced by the definite determiner (according to the definition in (36b)) are resolved to the situations that are introduced by the respective NPs themselves, i.e. in the example above to Peter's safari and to the conference last summer.

Let us now turn to the second part of the question above: Why can temporally non-specific properties only be shifted via the $\cap$-operator, while an application of the definite determiner seems to be blocked? An answer to this question seems to be less straightforward. There is no obvious reason why it should not be possible to map a temporally non-specific property to the maximal element in the extension of this property at the actual world (or some other salient world). Let us therefore assume that the world/situation variable introduced by the definite determiner is more constrained than assumed so far, viz. that it cannot be resolved to a salient world in its whole temporal extension, but only to some salient situation within a possible world. If this assumption is added, it might turn out that the question above is not appropriate, i.e. it might be the case that temporally non-specific properties *can* indeed be shifted via the definite determiner, but that as a result of such a shifting operation we do not receive the extension of the respective property in some salient world, but only the extension of this property in some salient situation[19].

The validity of this speculation is evidenced by the fact that in a given context, a plural definite often denotes the maximal sum individual that satisfies the respective predicate with respect to the situation that is salient in that context: for example, the definite DP in (34) and (35) above is acceptable in a sentence such as (37), if this sentence is uttered in a situation where a plurality of cars that were bought in the eighties is present, and where this plurality is furthermore contrasted with a plurality of cars that were bought in some other decade.

(37)    I like the cars that were bought in the eighties best.

The oddity of (34) and (35) now follows straightforwardly. Uttered out of the blue, there is no salient situation in the context that the situation variable $s_1$ introduced by the definite determiner could be resolved to. Neither can such a situation be accommodated. We will see in the next section that there is more to say about the resolution mechanism for the situation variable $s_1$. Suffice it at this point to note that there is no salient situation that $s_1$ can be resolved to. Hence, (35) is unacceptable.

As for the oddity of (34), consider the contrast between (38a) and (38b) (from Lenci and Bertinetto 2000).

(38)    a. The members of this club usually vote for the democrats.
        b. Members of this club usually vote for the democrats.

While (38a) can only be interpreted as saying that the current members of the club under discussion have the property of voting for the democrats in most elections, (38b) receives a QV-reading stating that most members of this club (including the current as well as the past and the future members) have the property of voting for the democrats.[20]

An interpretation that is analogous to the one of (38a) is not available, as the matrix predicate in (34) is an individual level predicate. It is implausible to assume that the maximal entity that is in the extension of the predicate *cars that were bought in the eighties* in the actual world at the speech time is such that the atoms have the property of being blue only in most (contextually restricted) eventualities where they are included (but not in all).

The only way out would be to apply some type-shifting operation equivalent to the DKP-rule. But this is only defined for objects of type $<s, e>$, not for objects of type $e$. While in a case where an object-level predicate is to be combined with a kind-denoting term (which is of type $<s, e>$), application of the DKP is the only option to save a derivation that would otherwise crash, there is no reason why a similar type-shift should be triggered in cases where an object-level predicate is to be combined with a plural definite, as the latter always denotes an object of type $e$.

Let us now return to the question why sentences like (32a) and (32c) still do receive QV-readings. Note that our discussion in this section leads us to the conclusion that the respective relative clauses introduce sum eventualities that are located within specific intervals. Furthermore, we already know how QVEs in adverbially quantified sentences containing plural definites do *not* come about: namely via quantification over eventualities that contain instantiations of the respective maximal sum eventuality. In the next section we will try to answer the question how they *do* come about.

*5.3 The final analysis*

Sentences including the quantifier *for the most part* such as (39a) have QV-readings that can be paraphrased as in (39b) (see Nakanishi & Romero 2004):

(39)  a. For the most part, the students admire Mary.
      b. Most of the students admire Mary.

Nakanishi & Romero assume that the QV-reading of sentences like (39a) does not come about via quantification over individuals, but via quantification over the atomic parts of a sum eventuality that is determined on the basis of the information structure. To be more precise, they assume that the Q-adverb *for the most part* has the denotation given in (40a) below, and that furthermore the focal part of a sentence is translated as the eventuality predicate $p$, while the non-focal part is translated as the eventuality predicate $q$. This has the consequence that (39a) is translated as in (40b), if it is assumed that the focussed element in this sentence is the direct object *Mary*. Furthermore, under the assumption that the cardinality of a sum eventuality is the cardinality of its atomic event units in $[[V^0]]$ – in this case, atomic *admiring* events – , (39a) and (39b) have equivalent truth conditions.

(40)  a. $\exists e\ [\mathbf{p}(e) \wedge \exists e'[e' \leq e \wedge |e'| \geq \frac{1}{2}|e| \wedge \forall e''[e'' \leq e' \rightarrow \mathbf{q}(e'')]]]$ .
      b. $\exists e\ [\text{Agent}(e, \text{the students}) \wedge \text{admire}(e) \wedge \exists e'[e' \leq e \wedge |e'| \geq \frac{1}{2}|e|$
              $\wedge\ \forall e''[e'' \leq e' \rightarrow \text{Theme}(e'', \text{Mary})]]]$ (ibd.: 8).

In Hinterwimmer 2005 and Endriss and Hinterwimmer 2005, we suggest that something similar is going on in sentences like (32a) and (32c). Frequency adverbs like *usually* come in two varieties that are systematically related to each other.[21] One variety takes the characteristic functions of sets of atomic eventualities as arguments, and establishes a relation between the cardinalities of the respective sets. This is the variety that is applied in sentences with singular indefinites. The other variety takes the characteristic functions of sets of plural eventualities as arguments, picks out an element from the two sets, respectively, and

establishes a relation between the cardinalities of the atoms contained within those elements. We assume that in the case of sentences like (33a) and (33c), it is this second variety of *usually* that is applied. This second variety of *usually* can plausibly be assumed to have essentially the same denotation as the one in (40a) above. The two eventuality predicates are determined in the way suggested by Nakanishi & Romero 2004.[22] The only additional assumption that we make is that the eventuality *e* (which defines the domain of quantification) needs to be located within a time interval that is initially given in the form of a free interval variable – in analogy to the assumptions made in section 3.3 with respect to quantification over sets of atomic eventualities. That is, we assume that the variant of *usually* that is applied in sentences like (32a) and (32c) denotes the object given in (41) below.

(41)    $\exists e [p(e) \wedge \tau(e) \subseteq i_e \wedge \exists e'[e' \leq e \wedge |e'| \geq \frac{1}{2}|e| \wedge \forall e''[e'' \leq e' \rightarrow q(e'')]]]$.

If we now assume that in an example like (32a) (repeated below as (42a)) the predicate *open-minded* is focussed, *p* is replaced by the eventuality predicate in (42b). The eventuality predicate in (42c) shows the eventuality predicate *q* is resolved to. Note that $s_1$ is the situation variable introduced by the definite determiner, which has to be resolved to a salient situation.

(42)    a.    The people that lectured on kangaroos at the conference last summer were usually open-minded.
        b.    $p = \lambda e.\text{Arg}(e, \iota x[\text{person}(x, s_1) \wedge \exists e'[\text{Agent}(e', x) \wedge \text{lecture}(e') \wedge \text{at}(e', \text{the}$
        c.    on k.s last summer) $\wedge \tau(e') < t_0]])$
        c.    $q = \lambda e.\text{open-minded}(e) \wedge \tau(e) < t_0$.

Now, according to the IRS, the interval $i_e$ in (41) needs to be resolved to the running time of the relative clause internal sum event of lecturing at the conference on kangaroos last summer, as this counts as the most specific locally available information. If this is done, the restrictor eventuality *e*, the (plural) argument of which are the people that lectured at the conference on kangaroos last summer, is located within the running time of the plural eventuality that consists of all the individual lectures given by those people during this conference. As this information does not contradict the tense information contained within the eventuality predicate that *q* is resolved to, there is nothing wrong with the resulting reading, which can be paraphrased as follows: there is a (plural) eventuality *e* that contains the maximal sum of people that lectured at the conference on kangaroos last summer, and this eventuality *e* is located within the running time of the sum eventuality that consists of all atomic lecturing events given by those people during that conference. Furthermore, there is an eventuality *e'* that is a part of *e* and that has at least half the cardinality of *e* such that for all parts *e''* of *e'* the following holds: *e''* is an eventuality of being open-minded the running time of which ends before the speech time.

Note that in example (42a), the situation variable $s_1$ can be resolved to the situation that is introduced by the definite DP *the conference last summer*. This is what differentiates between (42a) and (35) from the preceding section. We have argued that there is no salient situation that $s_1$ can be resolved to in case of (35). Now we can say why. We assume that the situation provided by *the cars that were bought in the eighties* does not provide a suitable situation, because the interval *the eighties* is too unspecific to count as a situation. Hence, $s_1$ is resolved to the speech time world. This has the consequence that the restrictor eventuality in (35) would have to fulfil the following criteria: (a) The argument of this sum eventuality is the sum individual that satisfies the property *cars that were bought in the eighties* at the speech time (this is enforced by the fact that $s_1$ is resolved to the speech time world by default). (b) The sum eventuality itself is located within the eighties (due to the interval resolution strategy). Let us assume that at least in the absence of contextual clues, it is very unlikely that

the hearer is willing to grant the existence of such a sum eventuality. Therefore, the strategy that could be applied in the case of (42a) does not work in the case of (35). Accordingly, the sentence does not have a QV-reading and is therefore odd (because it contains an individual level predicate).

Let us now consider the following example:

(43)　a.　$^{??}$The people that lectured on kangaroos at the conference last summer are usually open-minded.
　　b.　$p = \lambda e.Arg(e, \iota x[person(x, s_1) \wedge \exists e'[Agent(e', x) \wedge lecture(e') \wedge at(e',$ the
　　　　c.　on k.s last summer) $\wedge \tau(e') < t_0]])$
　　c.　$q = \lambda e.open\text{-}minded(e) \wedge t_0 \subseteq \tau(e).$

Here again, the situation variable $s_1$ could be resolved to the situation introduced by *the conference last summer*. And again the interval variable $i_e$ is resolved to the running time of the relative clause internal sum eventuality. But this time, there is a contradiction between this information, which concerns the temporal location of the restrictor eventuality *e*, and the temporal information contributed by the eventuality predicate given in (43b). The expressed proposition can only be true under the following condition: there is an eventuality *e* which is located within an interval that ends before the speech time such that there is an eventuality *e'* which is contained within *e* such that for all parts *e''* of *e'* it is the case that the running time of *e''* includes the speech time. But this of course can never be true: an eventuality that is located within an interval that ends before the speech time cannot have a part that consists of eventualities such that the running times of those eventualities include the speech time. We assume that therefore – in analogy to the case with singular indefinites discussed in Section 3.3 – a sentence like (43a) does not have a QV-reading, but only receives an interpretation where the plural definite is interpreted outside of the scope of the Q-adverb (and where furthermore a distributivity operator has applied to the denotation of the plural definite (see Link 1983)). This reading could be paraphrased as follows: For all atomic parts of the maximal entity that is a plurality of people who lectured at the conference on kangaroos last summer it is the case that they are open-minded in most (contextually restricted) eventualities. As *be open-minded* is an individual-level predicate (at least in its standard interpretation), (43a) is very odd.

## 6. Conclusion

We have shown that QV-readings do not only come about in sentences with singular indefinites and bare plurals, but also systematically show up in sentences with (also non kind denoting) plural definites. We have furthermore argued that all QV-phenomena involve quantification over eventualities. But whereas the availability of QV-readings for sentences with singular indefinites and plural definites is restricted by the *tense agreement constraint*, there is no such restriction for sentences with bare plurals. According to our approach, this difference is due to the fact that while different strategies are involved in all three cases, singular indefinites and plural definites insofar behave alike as they can be interpreted in the restriction of a Q-adverb *directly*. Bare plurals, on the other hand, have to be type-shifted in order to be interpretable in this position. This has the consequence that in the case of bare plurals modified by relative clauses the running times of the respective relative clause eventualities cannot be made use of in order to locate the eventualities quantified over – in contrast to singular indefinites and plural definites modified by relative clauses, where this is possible.

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[1] Note that we ignore the issue of taxonomic readings for indefinite singulars in this paper, as it is (almost) impossible to interpret the indefinite DPs in our examples taxonomically: After all, such readings are only possible if the respective NP-predicate can plausibly be interpreted as denoting a set of kinds. This, however, is very unlikely for a predicate like *car that was bought in the eighties*, as one usually does not have a set of kinds of cars in mind that satisfy this predicate.

[2] Kratzer 1995 and Musan 1997 discuss the following fact under the label *lifetime effect*: if a sentence like (i) below, which contains an individual-level predicate that is marked for past tense, is uttered out of the blue, it is strongly implicated that Gregory is either dead at the speech time or has changed his citizenship.

(i) Gregory was American.

Note however that this effect disappears if the sentence above is embedded in a context like the one given in (ii) below (see Musan 1997 for detailed discussion).

(ii) Yesterday, I met two nice people: Celine and Gregory. Celine was French, while Gregory was American.

[3] Furthermore, also the presence of adverbs like *still* and *nowadays* helps to make available QV-readings, as is evidenced by the examples below:

(i)      A car that was bought in the eighties is usually still roadworthy.
(ii)     A car that was bought in the eighties is usually rusty nowadays.

In Endriss and Hinterwimmer to appear we argue that this is due to the to the fact that both adverbs introduce intervals overtly, and that therefore the eventualities quantified over can be located within these intervals.

[4] While this has been discussed for sentences that contain adverbs of quantity like *for the most part* (see, for example, Lahiri 2002 and Nakanishi and Romero 2004, which are only able to induce QVEs on DPs that denote plural objects, it has not, to the best of our knowledge, been discussed that in principle also adverbs of frequency like *usually* can induce QVEs on non kind-denoting plural definites.

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[5] Furthermore, QV-readings are only available to sentences containing plural definites if the sum events introduced by the respective relative clause internal VPs can plausibly be assumed to consist of atomic events such that those events are temporally distributed. This is evidenced by the contrast between (6a) above and the sentence given in (i) below:

(i)     $^{??}$The people that listened to Peter's lecture on kangaroos at the conference last summer were usually open-minded.

In (6a), the lecturing event introduced by the relative clause VP can be assumed to consist of atomic lecturing events that are distributed over the whole duration of the conference, and the sentence receives a QV-reading easily. In the example below, on the other hand, the (plural) listening event introduced by the relative clause necessarily consists of events that coincide temporally, as the definite DP *Peter's lecture on kangaroos* can only denote one single lecture, and as one furthermore normally listens to a lecture from start to finish. For reasons of space, we cannot elaborate on this issue here, but see Endriss and Hinterwimmer 2005 and Hinterwimmer 2005 for extensive discussion and an analysis.

[6] See also Rooth 1985, 1992 and 1995, according to whom Q-adverbs quantify over time intervals.

[7] The term *eventuality* is meant to encompass dynamic as well as static "events".

[8] In the following, we will only give simplified representations like (10c), where material that already occurs in the restrictor is not repeated in the nucleus. This is justified on the assumption that theta roles are assigned exhaustively (see Herburger 2000), i.e. that each eventuality contains only one Agent, Theme, etc. In the following semantic representations, we will use the term *Arg(ument)* for the external arguments of stative predicates like *blue, intelligent* etc., because neither of the existing theta roles seems to be applicable in these cases. Nevertheless, we assume that these roles are also assigned exhaustively.

[9] In case of stative verbs, we assume that the largest eventuality of the respective kind that is included in the interval $i_e$ is picked out (see Endriss and Hinterwimmer to appear for details).

[10] Although there is a temporal adverbial (*the eighties*) restricting the eventuality variable introduced by the relative clause verb.

[11] We assume that the second occurrence of *e'* in (16) is bound dynamically by the existential quantifier that also binds this variable within the relative clause (see Groenendijk and Stokhof 1990 and Chierchia 1995b for a detailed discussion of the principles of dynamic binding).

[12] 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 eventualities and the matrix eventualities, 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 the examples in (18) 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.

[13] But see especially Dayal 2004 for arguments that kind-referring singular definites nevertheless denote objects of a different kind than bare plurals.

[14] Chierchia 1998 proposes a very intricate system, according to which there is a semantic parameter that distinguishes languages like English, where bare NPs denote properties and therefore need to be shifted to objects of type *e* in order to occupy argument positions, and languages like Chinese, where bare NPs already denote objects of type *e* (namely, kinds) and can therefore directly serve as arguments.

[15] Note that Chierchia 1998 himself assumes that Q-adverbs may quantify over individuals as well as over situations.

[16] In case of bare plurals, the respective instantiation individuals may be plural objects. As this may lead to problems similar to the proportion problem (Partee 1984 and Kadmon 1987) or the requantification problem (von Fintel 1994), one needs to adopt similar repair strategies such as minimal situations. Alternatively, it seems reasonable to assume a pragmatic principle that selects the singular individuals as instantiations of a kind by default in lack of any other contextual information.

[17] Of course no such effect is triggered in the case of sentence (3b): There, the Q-adverb (due *to* the Interval Resolution Strategy) only quantifies over past eventualities in the first place (cf. the discussion of lifetime effects in Musan 1997).

[18] Note that Chierchia's principle of lexical blocking, according to which covert type shifts are only allowed if the respective language does not have a lexical element that would do the same thing (see Chierchia 1998 for details), is not applicable in this case: what is at issue here is not the question whether a certain object is created by the application of a lexical element or by a covert type-shift. Rather, the question is why only one of two objects can be generated in each case, i.e. why the properties in (33) cannot be shifted to objects of type <s, *e*>,

but only to objects of type *e*, while the property in (34) cannot be shifted to an object of type *e*, but only to an object of type *<s, e>*.

[19] It is plausible to assume that boundedness is relevant here: the intuitive idea is that definite descriptions denote bounded entities, while kinds are unbounded entities. This would have the consequence that the definite article is only compatible with clearly confined time intervals/situations, while the $\cap$-operator is only compatible with time intervals/situations that have no clear boundaries. But working this out in detail is something that we have to leave to future work.

[20] Note that the QV-reading of (38b) can easily be explained under our assumptions. The Q-adverb can be assumed to quantify over eventualities each of which contains an instantiation of the kind *members of this club*.

[21] In Hinterwimmer (2005) it is speculated that it is possible to define one basic denotation for Q-adverbs like usually.

[22] In Hinterwimmer 2005 (see also Endriss and Hinterwimmer 2005) a different mapping algorithm is suggested, as it is not clear how the focal and the non-focal part of an eventuality predicate can be separated in a compositional manner.