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# EXCEPTION SENTENCES AND POLYADIC QUANTIFICATION*

Exception sentences such as (1a) and (1b) pose many challenges for a compositional semantic analysis within a general theory of natural language quantification:

(1) a. Every boy except John came.
b. No boy except John came.

In this paper, I develop a compositional semantic analysis of exception constructions within the theory of generalized quantifiers. This analysis meets three basic adequacy conditions on a semantic theory of those constructions:

1. It explains the basic semantic properties of exception constructions; in particular, it explains the restriction on the NPs with which an exception phrase may associate to (basically) those denoting universal and negative universal quantifiers.
2. It is general enough to apply to the full range of NPs with which an exception phrase may associate.
3. It accounts for the full range of complements that exception expressions such as *except* or *but* may take; in particular, it accounts for quantified and disjoined complements.

Besides providing a semantics of exception constructions, this paper presents results on natural language quantification that are of independent interest. Most importantly, it provides new evidence for polyadic quantification in natural language. In particular, it shows that several NPs in a clause may together denote a polyadic quantifier to which an exception phrase may then apply.

This paper is divided into two parts. The first part contains the semantic

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* The material discussed in this paper was in part presented already in a chapter of my dissertation (Moltmann 1992a). However, that chapter was rather descriptive in nature and no proper semantic analysis was developed.

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analysis of simple exception sentences (involving only monadic quantifiers). I will first introduce three basic semantic properties of exception constructions and show that prior analyses of exception sentences fail to account for some of those properties. I will present my own analysis of exception constructions first for the simplest case, in which the complement of *except* or *but* refers to a specific exception set, and then refine the analysis so that it can apply also to quantified NPs as the complement of *except* or *but*. Finally, I will show how the analysis can apply to certain clausal exception constructions.

The second part of this paper treats exception sentences involving polyadic quantification. I will first present exception constructions in which the exception is specified as an n-tuple (or a set of n-tuples) and show how the analysis developed in the first part can straightforwardly be extended to these constructions. As a second type of exception construction involving polyadic quantifiers, I will present sentences in which the constraint on the associate of the exception phrase is satisfied not by the NP the exception phrase seems to modify, but rather by the larger context in which this NP occurs. I then turn to the issue of the syntactic basis of the formation of polyadic quantifiers and give a speculative account. Finally, I will briefly present some further exception constructions involving polyadic quantification.

# PART I. THE SEMANTICS OF SIMPLE EXCEPTION CONSTRUCTIONS

## 1. Some Basic Distinctions and Terminology

In this part, I will restrict myself to exception constructions in which only one quantifier occurs or is relevant, as in (1a), repeated here as (2):

(2) Every boy except John came.

I will call those exception sentences **'simple exception constructions'**.

Let me at the outset introduce some basic distinctions and some terminology concerning exception constructions. I will use the abbreviation **'EP'** for 'exception phrase'. Furthermore, I will call the NP or the quantifier that an exception phrase syntactically and semantically associates with 'the **associate** of the exception phrase', for short **'EP-associate'**, and the complement of the exception expression, i.e. *except*, *but*, or *except for*, 'the **EP-complement**'. Thus, in (2) the EP-associate is *every boy* and the EP-complement *John*.

An important distinction that has been made in the literature (cf. Hoeksema 1989, 1991, von Fintel 1993, Reinhart 1991) is between two syntactically different types of EPs: **connected exception phrases**, where the EP is adjoined to the NP or has been extraposed from that position, and **free exception phrases**, where, basically, the EP is in adverbial position. EPs of the form *but* NP and *except* NP, as in (3a), are connected EPs; EPs of the form *except for* NP, as in (3b), are free EPs:

(3) a. Every man but/except John came.
b. Except for John, every man came.

In the following, I will assume that connected and free EPs have essentially the same semantics, though they involve different syntactic structures as the basis for their interpretation.[1]

I will make the following general semantic assumptions. I take determiners such as the denotation of *every* to be functions from sets to sets of sets (or sets of relations). Generalized quantifiers, the denotations of NPs, then are sets of sets (or sets of relations). For example, the denotation of *every boy* will be the set of sets which contain the set of boys as a subset, the denotation of *no boy* will be the set of sets containing no boy, and the denotation of *some boy* will be the set of sets containing at least one boy. In the semantic analyses that I propose I will give direct interpretations of relevant natural language expressions, rather than using a logical language as an intermediate language into which natural language expressions are translated. I will denote the semantic value of an expression such as *every boy* in a model by '[*every boy*]' without explicit reference to the model, except if such explicit reference is crucial.

## 2. Basic Semantic Properties of Exception Constructions

### 2.1. *The Negative Condition*

The first basic semantic property of exception constructions is that they carry what I call the **'negative condition'**; that is, simply, the exceptions have to be exceptions. More precisely, applying the predicate to the exceptions should yield the opposite truth value from applying the predicate to nonexceptions. In case the associated quantifier is positive, applying the predicate to the exceptions should yield a negative truth value; in

[1] See Reinhart (1991) for a proposal of assimilating the syntax of free EPs to the syntax of connected EPs.

case the quantifier is negative, it should yield a positive truth value. Thus, (4a) implies that John did not come and (4b) that John came:

(4)a. Every boy except John came.
b. No boy except John came.

So the condition is:

(5) *The Negative Condition*
Applying the predicate to the exceptions yields the opposite truth value from applying the predicate to nonexceptions.

The importance of the Negative Condition can be seen from the contrast with the expression *other than*. *Other than*-phrases also syntactically associate with an NP, and they seem to have a similar semantic function as EPs; but unlike EPs, they do not carry the Negative Condition:

(6) John came, and everybody other than John came.

But there are also expressions that associate with an NP and are not EPs, but still impose the Negative Condition, for example *but not*-phrases as in (7):

(7) Some people, but not John, went to the movie.

I will come back to the semantics of *other than*-phrases and *but not*-phrases later.

## 2.2. *The Condition of Inclusion*

The second basic semantic property of EPs is that the entities that are specified as the exceptions must fall under the restriction of the associated quantifier. Thus, the sentences in (8) both imply that John is a boy:

(8)a. Every boy except John came.
b. No boy except John came.

I will call this property the **'Condition of Inclusion'**:

(9) *The Condition of Inclusion*
The exceptions must belong to the restriction of the associated quantifier.

*Other than*-phrases also impose the Condition of Inclusion, although, as we have seen, they do not impose the Negative Condition. (10) implies that John is a boy, although it does not imply that John did not come:

(10) Every boy other than John came.

Conversely, *but not*-phrases impose the Negative Condition, but not the Condition of Inclusion. Thus, (11) is fine:

(11) Every man but not Mary came.

### 2.3. *The Quantifier Constraint: First Observations*

The most interesting property of exception phrases is that they impose a general condition on the quantifier they associate with. The condition, basically, is that the quantifier be either universal or negative universal. That is, the quantifier may be *every*, *all* or *no*, but not, for instance, *most*, *few*, or a cardinal quantifier. This constraint is illustrated in (12):

(12) Every boy/All boys/No boy/#Most boys/#A lot of boys/ #Three boys/#At least three boys/#Few boys but/except John came.

Free EPs impose the same constraint (though speakers initially sometimes allow the quantifiers *most* and *few* as well, an issue I will disregard):

(13) Except for John, every boy/all boys/no boy/*a lot of boys/ *three boys/(?) most boys/(?) few boys came.

I will call the restriction of EPs to universal and negative universal quantifiers the **'Quantifier Constraint'**. (I will later discuss the possibility of whether other quantifiers may be allowed as well.) In a first approximation, this constraint can be stated as follows:

(14) *The Quantifier Constraint* (*approximation*)
The NP that an exception phrase associates with must denote a universal or negative universal quantifier.

Is the Quantifier Constraint a semantic or a syntactic constraint? Because it mentions semantically defined classes of quantifiers, it appears semantic in nature. But let us consider for a moment the possibility that it is syntactically conditioned. Imposing the following condition might be a way to exclude exception sentences with unacceptable associated NPs syntactically: NPs allow for only one expression whose content consists in a specification of the cardinality or constitution of the domain associated with the NP. This restriction would be a uniqueness condition on a certain syntactic function in NPs. Since EPs provide information about the constitution of a quantification domain, they would, in some way, fulfill this function. Therefore, cardinality attributes such as *many* and *three* cannot cooccur with an EP. Let me note that an account in this spirit has actually been proposed by Carlson (1981) for amount relatives, which impose similar restrictions.[2]

However, this syntactic explanation can be shown to be inadequate. In its empirical predictions, it is both too strong and too weak. It is too strong, for example, by ruling out the acceptable (15), where a universal quantifier cooccurs with a cardinality attribute:[3]

(15) all three hundred students/all those many students except John

The syntactic explanation furthermore is too weak, since even quantifiers without cardinality specification may disallow EPs, as in (16):

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[2] Von Fintel (1993) suggests that the fact that free EPs seem to associate with the quantifiers *most* and *few* means that free EPs are not subject to the Quantifier Constraint. But free EPs still exclude almost all quantifiers that are not universal or negative universal, as seen in (1):

(1) #Ten boys/More than half of the boys came except for Bill.

Another apparent counterexample to the Quantifier Constraint are EPs that associate with a universal quantifier modified by *almost*:

(2) Almost every boy except John came.

However, it appears that *almost* here attaches to *everybody except John*, rather than *except John* attaching to *almost every boy*. The evidence comes from data with coordination such as:

(3)a. almost [every boy except John and every girl except Mary]
b. #almost every boy and almost every girl except John

(3a) with the bracketing given shows that *almost* may modify an NP with an EP. (3b) indicates that exception phrases may not modify NPs with *almost*.

Thus, the Quantifier Constraint is satisfied in (2), given the bracketing *almost* [*every boy except John*].

Note, however, that *almost* itself can be considered an EP, meaning something like 'at most ten percent'. Then the problem arises of how the Quantifier Constraint is satisfied in (2) by *every boy except John* and *almost*, since *every boy except John* does not denote a universal quantifier. However, the condition I will introduce in Section 4 for deriving the Quantifier Constraint (the Homogeneity Condition) will be able to account for (2). It only has to be assumed that (2) is allowed to be interpreted as something like 'every boy except at most ten percent of the boys besides John' (let us say, by local accommodation). For then the Homogeneity Condition is satisfied.

[3] Universally quantified NPs with certain numeral specifiers are indeed incompatible with EPs, though:

(1)a. #neither/both students except John
b. #all three students except John

The badness of (1a) and (1b) may be attributed to a pragmatic condition which prohibits entities which are explicitly mentioned as verifiers (at least in number) not to also be specified as exceptions in one and the same NP. The condition should be such that the larger the cardinality, the less an individual entity is considered 'explicitly mentioned'.

(16) #not all students/#the students/#students except John

The syntactic approach also fails for a more principled reason. Exception sentences exhibit an interesting phenomenon which I will come back to at various stages in this paper. The phenomenon is that free EPs may operate at a **level of implications** or semantic structuring, a level of semantic representation at which the meaning expressed by the sentence without the EP may be represented by some equivalent content. At that level, the EP may apply to a quantifier that is relatively independent of any particular expression in the sentence. Since it appears that in such cases the quantifier is still subject to the Quantifier Constraint, the constraint cannot be a matter of a syntactic co-occurrence restriction (cf. Moltmann 1992a). Two relevant examples are given in (17):[4]

(17) a. Except for the door, John painted the house/#part of the house red.

b. The place is deserted/#not crowded except for a cat.

The EPs in these examples can best be analysed as applying to a quantifier which is part of a proposition that is equivalent to what the sentence without the EP expresses. The contrast between the first and the second sentence in (17a) is then explained as follows. Given the meaning of *paint* and *the house*, the first example in (17a) can be understood as roughly equivalent to the proposition 'John painted every part of the house red'. This proposition (at the level of implications) provides a universal quantifier ranging over the parts of the house, and this is the quantifier to which *except for the door* applies, satisfying the Quantifier Constraint. By contrast, with *part of the house*, an equivalent proposition could only provide an existential ranging over the parts of the house, not a universal quantifier, hence violating the Quantifier Constraint. A similar explanation accounts for the contrast between *deserted* and *not crowded* in (17b).[5]

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[4] Some languages, for example German and Dutch, cannot use the same exception expressions here. In German, *bis auf* is much better than *ausser* 'except (for) in such contexts':

(1) a. Der Raum ware leer bis auf einen Stuhl/#ausser einem Stuhl.
'The room was empty except for a chair.'

b. jeder Mann bis auf Hans/ausser Hans
'every man except for John.

[5] There are constructions with what I call 'inclusion' and 'exclusion phrases' which seem to semantically act like EPs, but fail to impose the Quantifier Constraint. Inclusion and exclusion phrases as in (1) appear to semantically operate on a generalized quantifier: they add or subtract a set to or from each of the elements in a generalized quantifier.

(1) Every student including John/excluding John came.

But inclusion and exclusion phrases can associate with quantifiers other than universal and

Such examples show that the restriction of EPs to universal (and negative universal) quantifiers obtains regardless of whether the EP applies to a quantifier denoted by a syntactically present NP or to a quantifier that comes about only at the level of implications (or semantic restructuring) of what the rest of the sentence means. Hence the condition enforcing the restriction to universal and negative universal quantifiers as the associates of EPs must be purely semantic in nature.[6]

Clearly, explaining the Quantifier Constraint constitutes an important adequacy condition on a semantic theory of exception constructions. The restriction to universal or negative universal quantifiers should follow from some semantic condition associated with EPs. The challenge that the Quantifier Constraint poses is that it is not obvious why it should be enforced at all. In this respect, it is useful to note that the semantically related constructions with *other than* and *but not* do not impose the Quantifier Constraint:

(18) a. Some/Three/Most boys other than John came.
b. Some/Three/Most boys but not John came.

Thus, even though, like EPs, *other than*-phrases also impose the Condition of Inclusion, and *but not*-phrases impose the Negative Condition, the semantics of these phrases should be different from the semantics of EPs. Let me therefore briefly spell out what can be taken to be the meaning of *other than*-phrases and *but not*-phrases.

The semantic operation associated with *other than*-phrases is most plaus-

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negative universal quantifiers, as seen in (2) and (3):

(2) a. Several students/A lot of students including John came.
b. Ten students including John came.
(3) a. Several students/A lot of students excluding John came.
b. Ten students excluding John came.

Exclusion phrases often have the same semantic function as EPs. But since they can associate with quantifiers other than universal and negative universal quantifiers, they seem to involve a rather different semantics.

[6] There are certain constructions that seem to go against the generalization that the constraint on the associate of the EP is semantic in nature, namely quantifiers such as *zero*, *between ten and ten*, or *less than one*, as in (1):

(1) #Zero students/Between ten and ten students/Less than one student except John failed the exam.

As (1) shows, these quantifiers disallow EPs, even though they are logically equivalent to the negative universal quantifier *no*. (see Keenan 1987b for similar arguments against the semantic account of the indefiniteness effect in existential sentences by Barwise/Cooper 1981). However, the conclusion that I would draw from the data in (1) is rather that they are marginal constructions and do not belong to the core of language.

ibly a modification of the restriction of the associated quantifier, as in (19):

(19) $[$*boy other than John*$] = \{x \mid [$*boy*$](x)\ \&\ x \neq [$*John*$]\}$

From this, the semantic properties of *other than*-phrases can be derived. In order for *other than*-phrases not to operate vacuously, the complement of *other than* should refer to an entity in the restriction of the quantifier. The Negative Condition clearly will then not be imposed. And also there is no reason why the Quantifier Constraint should be enforced.

The semantic operation associated with *but not*-phrases is generally conceived as the intersection of two generalized quantifiers, where the second quantifier is negated (cf. Keenan/Faltz 1985). Thus, *every boy but not Mary* will denote the intersection of the properties that every boy has with the properties that Mary does not have, as in (20):

(20) $[$*every boy but not Mary*$] = \{P \mid P \in [$*every boy*$]\ \&$
$P \in (\neg[$*Mary*$])\}$

Given the meaning of *other than*-phrases and *but not*-phrases, it is clear what EPs should not mean: EPs cannot just impose an operation on the restriction of the quantifier, and they cannot just enforce an intersection of a quantifier with some other quantifier.[7]

Let me now turn to the semantic analysis of EPs. Before presenting my own analysis, I will first discuss two other semantic approaches: first, Hoeksema's approach, which assumes that EPs enforce a global semantic operation on the model with respect to which the sentence is evaluated; and second, von Fintel's approach, who adopts the idea that EPs enforce a semantic operation on the restriction of the associated quantifier, subject to an additional semantic condition. We will see that these approaches lead to several empirical and conceptual problems.

[7] There are other proposals concerning the semantics of exception constructions which I will not discuss in this paper. Keenan/Stavi (1986) propose an analysis in which an EP is part of the determiner, forming a complex determiner such as *every . . . but John*. See Hoeksema (1989, 1992) for a critical discussion of their proposal. Hoeksema (1992) suggests a third analysis of EPs, which is based on substitutional quantification and in which an EP subtracts an atomic proposition from a set of propositions. This proposal, however, remains rather sketchy and stipulative.

## 3. Prior Proposals of the Semantics of Exception Phrases

### 3.1. *Exception Phrases as Modifiers of Domains or Models*

Hoeksema in his earliest paper on EPs (Hoeksema 1987) proposes that free EPs subtract a set of elements from the universe with respect to which the entire sentence is evaluated. The semantics of exception sentences is then roughly as in (21), where E is the universe with respect to which the sentence S is evaluated and C the term standing for the exception set:

(21) $[\textit{Except for}\ \mathrm{C}, \mathrm{S}]_{\mathrm{E}}$ is true iff $[\mathrm{S}]_{\mathrm{E} \setminus [\mathrm{C}]}$ is true.

Thus, on Hoeksema's (1987) view, EPs involve a global semantic operation, affecting the evaluation of the entire sentence. Hoeksema in later papers (1989, 1992) himself notes a number of counterexamples to the view that EPs subtract a set from the universe with respect to which the entire sentence is evaluated. Generally, it appears, only **one** NP may be affected by an EP. Hoeksema (1989) gives the example in (22a). Another type of example showing the same point is given in (22b):

(22) a. John's father hates everybody except John.
b. Some people hate everybody except themselves.

In (22a), the EP subtracts an element from the domain of a quantifier which is the referent of another NP in the sentence. Furthermore, (22b) could not possibly be true if the semantic values of *themselves* were subtracted from the entire universe, since *themselves* acts as a variable bound by an existential quantifier in the same sentence.

Another type of counterexample was later also noted by Hoeksema (cf. Hoeksema 1992):

(23) a. In a graphic tree, except for the root node, every node is dominated by another node. (Hoeksema 1992)
b. Except for my youngest sibling, everybody in my family has a younger sibling.

In (23a), if the EP would take away the 'root node' from the universe of the entire sentence, it would not make the sentence true, but rather create as many new exceptions as there are nodes in the tree immediately dominated by the root node. Similarly for (23b).

Hoeksema in a later paper (Hoeksema 1989) presents a different proposal in order to account for (22a). He proposes that EPs do not modify the universe, but rather the entire model; they are 'minimal updating operators' on the model. This proposal is informally given in (24), where

Q stands for the quantifier the EP associates with, A for the restriction, and B for the scope; C, again, stands for the exception set:

(24) A sentence of the form Q(A) *except* C B is true in a model M iff in every model M′ which minimally differs from M in that for any $c \in [C]^{M'}$, $[B]^{M'}(c)$ yields the opposite truth value in M′ from the one it yields in M, it is the case that Q(A)B is true in M′.

This proposal accounts for the counterexamples of the type in (22). However, as Hoeksema later (Hoeksema 1992) notes, the examples in (23) still present serious problems for it.

The conclusion to be drawn from the examples in (22) and (23) is that EPs do not affect the evaluation of the sentence as a whole, but rather only the quantifier they associate with, leaving the semantic evaluation of the other parts of the sentence unaffected. That is, EPs involve only a local semantic operation on the associated quantifier:[8]

(25) *The local semantic nature of exception phrases*
Exception phrases involve a semantic operation affecting only the associated quantifier.

The semantic operation associated with an EP is therefore best considered an operation on the quantifier that the associated NP denotes. But what kind of semantic operation? A first possibility is that it is an operation on the restriction of the quantifier which subtracts the exceptions from that restriction. However, from the earlier discussion of *other than*-phrases, it is clear that this will not suffice. Taking away entities from the restriction of the quantifier is exactly what *other than*-phrases do, and we have seen that this will not explain two of the three basic properties of EPs: the Negative Condition and the Quantifier Constraint. Therefore, either further semantic conditions have to be imposed on what EPs do when they take away entities from the restriction of the quantifier, or the idea has to be abandoned that EPs operate on the restriction. The first alternative has been adopted by von Fintel (1993). The second alternative is the one I will advocate. Let me first discuss von Fintel's proposal.

[8] In the range of exception constructions discussed in this paper, there are two cases in which the associated quantifier is not denoted by a single NP: one of them are free EPs operating at the level of implications; the other one are EPs applying to a polyadic quantifier formed from two or more quantifiers or operators in the sentence (cf. Part II). In both cases, on my account, the exception operation affects only a single (monadic or polyadic) quantifier, but no other semantic components of the proposition expressed by the rest of the sentence; also, it does not affect the model with respect to which the entire sentence is evaluated.

### 3.2. *Exception Phrases as Operators on the Restriction of a Quantifier*

Von Fintel (1993) proposes that EPs semantically operate on the restriction of the associated quantifier, but subject to an additional condition, namely a **uniqueness condition** on the exception set. Von Fintel proposes the following condition on sentences with EPs: a sentence with an EP is true iff the EP-complement refers to the smallest set of entities such that, if this set is subtracted from the quantification domain of the associated quantifier, the sentence comes out true. Von Fintel formulates the semantics of exception sentences as in (26), where D stands for the determiner in question, A and B stand for its two arguments, and C is the term standing for the exception set:

(26) *Von Fintel's (1993) account of exception sentences*
[D A *except* C B] = true iff [C] is the smallest set such that [D] ([A]\[C]) [B] = true.

In order for (26) to apply, another assumption is necessary, which von Fintel in fact makes, but is not quite explicit about. This assumption is that there is a unique, nonempty set that the EP-complement specifies as the exception set:

(27) *The Uniqueness Condition on the EP-complement*
The EP-complement specifies a unique set as the exception set.

(27) can be satisfied only when the EP-complement is a specific singular or plural NP. And in fact von Fintel claims that this constraint holds.

Let me first show how (26) applies to the various cases and then come to a critical discussion of von Fintel's proposal.

The main advantage of (26) is that it applies to negative and positive quantifiers uniformly and that, as von Fintel claims, the Quantifier Constraint follows from it.[9] Furthermore, from (26) both the Condition of

[9] Another argument von Fintel (1993) gives for his proposal is that it correctly predicts that EPs with *but* cannot be iterated:

(1) *every man but John but Bill

Note, though, that this argument is rather weak in view of the fact that multiple adjunctions of the same type of PP are generally excluded:

(2) *the book about America about politics

The reason for the unacceptability of (2) and also (1) is clearly syntactic, since coordinations of such PPs are fine:

(3) the book about John and about Mary

Moreover, there are clear cases that show that EPs can be iterated:

Inclusion and the Negative Condition follow. Let us first look at that and apply (26) to the examples in (28):

(28) a. Every boy except John come.
b. No boy except John came.

If (28a) is true, then {John} is the smallest set such that, when it is subtracted from the set of boys, *every boy came* is true. But this means that John is a boy; otherwise, the empty set would be the smallest set, contrary to the assumption. The same reasoning holds for (28b). The Negative Condition follows in a similar way. If (28a) is true, then John did not come. Otherwise, the empty set would be the smallest set which, when subtracted from the quantification domain, would make the sentence true.

Let us now see how the Quantifier Constraint could be derived from (26). EPs associated with quantifiers such as *most*, *many*, and *few* are generally ruled out since with these quantifiers the EP generally does not denote a minimal and unique set, satisfying the condition in (26). Consider, for example, *most* as in (29) in a situation in which two students passed the exam and John and Bill did not pass the exam:

(29) #Most students except John passed the exam.

Applying (26) to (29), {John} is not the only minimal exception set which, when taken from the set of students, would make the sentence true; the set {Bill} would be another such set.

Furthermore, von Fintel's condition makes the right predictions with respect to NPs with numerals such as in (30):

(30) #Ten students except John passed the exam.

Let us consider the three most interesting models for (30). First, in a model with ten students, nine of whom passed the exam, John being the only student not having passed the exam, (30) does not come out as true. Taking away the singleton set containing John from the set of students just does not make the sentence true. Second, in a model with exactly eleven students, ten of whom passed the exam, John being the only one

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(4) Except for a few, Mary admires every musician except John.

Thus, the general meaning of EPs does not prohibit iterations, and, in fact, my account allows for them.

Note also that *except*-phrases may be coordinated, though *but*-phrases may not:

(5) a. every man except John and except Bill
b. *every man but John and but Bill

not having passed the exam, (30) does not come out as true either. {John} would not be the smallest set satisfying the condition in (26), but rather the empty set. Finally, in a model with exactly eleven students all of whom, including John, did not pass the exam, *ten students passes the exam* does not come out as true. {John} would be a minimal set satisfying the conditions in (26), but it is not a unique set. Any singleton set containing a student would be a minimal set such that, when it is taken away from the set of boys, the sentence without the EP would become true.

(26) works quite well in predicting the Quantifier Constraint for most cases. However, there are both conceptual and empirical problems with von Fintel's account. Let me first discuss the empirical problems.

First, there are examples violating the Quantifier Constraint, where the account makes the wrong predictions. In a model in which John and Mary are the only students and Mary passed the exam, but not John, (31a) and (31b) (an example noted by von Fintel himself) are unacceptable – as they are in any model; and in a model with three students among whom only John did not pass the exam, (32) is unacceptable:

(31) a. #More than half of the students except John passed the exam.
b. #Most students except John passed the exam.

(32) #More than two thirds of the students except John passed the exam.

Von Fintel's account predicts (31a), (31b), and (32) to be true in the models described. For instance, in the case of (33a), the set {Mary} makes up all, and hence more than half, of the students that passed the exam; and {John} is the smallest set such that, when subtracted from the quantification domain, *more than half of the students passed the exam* becomes true.

These violations of von Fintel's condition show a very general point about the nature of the constraint on the EP-associate. This constraint must take into account other models with respect to which the exception sentence may be evaluated and cannot just be accidentally satisfied by a given model. I will come back to this point in the next section.

There are other empirical problems with von Fintel's proposal. First of all, von Fintel's proposal does not apply to exception sentences which allow for a potentially empty exception set, as in (33) and in (34a) with the exception expression *almost*, which, as (34b) shows, also imposes the Quantifier Constraint:[10]

(33) a. all students except at most three
b. all students except at most John

(34) a. Almost every man came.
b. Almost all men/no men/#few men/#most men/# some men came.

*Almost* basically has the semantic function of an EP; but it does not specify what the exceptions are, and moreover, it does not even imply that there is an exception (since (34a) would not be false if no man came).

A related problem with von Fintel's proposal is that it does not apply to quantified EP-complements as in (35):

(35) Every boy except one/except exactly three came.

The examples in (33), (34a), and (35) show that the assumption (27), a presupposition for (26) to be applicable at all, does not hold.

Another problem of empirical coverage with von Fintel's proposal concerns the nature of the EP-associate. Von Fintel's account presupposes that EPs associate only with an NP in which the N′ acts as the restriction of the quantifier that the NP denotes. But there are exception constructions where this is not the case, for instance those in (36):

(36) a. every man and every woman except the parents of John
b. ?neither John nor Bill nor Mary nor Sue except the oldest
c. the wife of every president except Hillary Clinton

Let me now turn to the conceptual problems with von Fintel's account. One of them is that it is not compositional in nature. Even though the operation of domain subtraction is a local semantic operation applying only to the restriction of the associated quantifier, the Uniqueness Condition is a global condition, involving the truth conditions of the entire sentence: it requires that the entire sentence without the EP already be evaluated in order for the EP to have its semantic effect in the sentence.

[10] I will not give a satisfactory treatment of *almost* in this paper. I take it that *almost* means something like 'except less than ten percent' and hence falls under EPs with quantified complements which are analysed in Section 6. See also Fn. 2.

Note, that *almost* also allows larger cardinals and degree words, as in (1a, b):

(1) a. almost a hundred men/#ten men
b. John weighs almost 200 pounds.

Thus, unlike other EPs, *almost* may apply also to a scale of degrees or numbers.

Another conceptual problem is that von Fintel's proposal, as stated in (26), confuses truth conditions with acceptability conditions. An exception sentence not meeting (26) is not false, as von Fintel would predict, but rather unacceptable. For example, *some men except John came* is simply unacceptable, not false. There does not seem to be a way to recast (26) so that it separates truth and falsehood from acceptability.[11]

## 4. A New Semantic Analysis of Exception Constructions

### 4.1. *The Basic Idea*

The point of departure of the present proposal is that EPs semantically are functions from generalized quantifiers to generalized quantifiers, that is, sets of sets (or, as we will see in Part II, sets of relations). More precisely, when an EP applies to a generalized quantifier, it modifies the sets in this quantifier and yields another set of sets. How do EPs modify these sets? They do either one of two things:

[1] **subtract** the exceptions from the sets in the generalized quantifier, or

[2] **add** the exceptions to the sets in the generalized quantifier.

[1] applies in case the quantifier is positive. In the case of *every boy except John*, *except John* applies to the set of sets containing all the boys and takes

[11] To see this, consider the most plausible way of restating (26). Take the model mentioned above for the sentence *ten students except John came*, where ten students including John came. Furthermore, consider the sentence *every student except John came*, in a model in which every student including John came. In order to make the first sentence come out as unacceptable and the second one as false, one would have to separate the condition of the exception set being the smallest set into a minimality condition and a uniqueness condition. This would yield a modification of von Fintel's proposal within a three-valued semantics as follows:

(1) $$[D\ A\ \textit{except}\ C\ B] \begin{cases} = \text{true if } [C] \text{ is the unique minimal set such that} \\ \quad [D]([A]\setminus[C])([B]) = \text{true.} \\ = \text{false if } [D]([A]\setminus[C])([B]) = \text{false or } [C] \text{ is not a} \\ \quad \text{minimal set such that } [D]([A]\setminus[C])[B] = \text{true} \\ = \text{undefined otherwise.} \end{cases}$$

Given (1), the first sentence above comes out unacceptable, since {John} is minimal, but not unique (with respect to the relevant condition); and the second sentence comes out as false, since {John} is not minimal (the empty set is a smaller set satisfying the relevant condition). However, (1) now gives the wrong result for the sentence *some boy except John came* in a model in which John and some other boy came. Again, {John} is not minimal (only the empty set is); but still the sentence is unacceptable, rather than false. Note, moreover, that the reformulation of (26) as (1) above loses some of the appeal of (26) in that it involves a disjunctive condition for falsehood.

John away from each one of these sets. [2] applies when the quantifier is negative. In the case of *no boy except John*, *except John* applies to the set of sets containing no boy and adds John to each one of these sets.

However, in order for the semantic operation associated with an EP to be applicable to a set of sets and subtract or add elements, a certain precondition has to be satisfied: either the entities specified as the exceptions are **included** in every set in the generalized quantifier, or they are **excluded** from every set in the generalized quantifier. In order for [1] to apply, the exceptions have to be included in every set, and in order for [2] to apply, they have to be excluded from every set. In the case of *every boy except John*, given that John is a boy, John is included in every set in the denotation of *every boy*; hence the operation of subtraction can apply. In the case of *no boy except John*, John is excluded from every set in the denotation of *no boy*, hence the operation of addition can apply.

I will call the condition of either being homogeneously included in every set in the quantifier or being homogeneously excluded from every set in the quantifier the **Homogeneity Condition**, which can be defined as the following relation:

(37) A (generalized) quantifier Q *satisfies the Homogeneity Condition* with respect to a set C (Hom(Q, C)) iff either $C \subseteq X$ for all $X \in Q$ or $C \cap X = \emptyset$ for all $X \in Q$.

The Homogeneity Condition will play a crucial role in explaining the Quantifier Constraint, and it also accounts for the Condition of Inclusion.

The satisfaction of the Homogeneity Condition influences the acceptability, not the truth, of an exception sentence. If the Homogeneity Condition is not satisfied for an exception NP, the denotation of that NP will be undefined, and hence the denotation of the sentence containing the NP will be undefined, as well. Thus, my proposal strictly separates acceptability conditions and truth conditions. I will come back to the role of the Homogeneity Condition later.

Now the semantics of EPs can be given in a preliminary way. The denotation of *except* (as well as *but* and *except for*) is taken to be a function which maps an NP-denotation (the denotation of the EP-complement) to a function from generalized quantifiers (the denotation of the EP-associate) to generalized quantifiers. Thus, *except* is of type $\langle\langle e, t\rangle, \langle\langle\langle e, t\rangle, t\rangle, \langle\langle e, t\rangle, t\rangle\rangle\rangle$. At this point, I will take into account only EP-complements that are definite singular or plural NPs. The analysis will later be extended to other types of NPs. For the moment, I will say that if the EP-complement is singular, it denotes a singleton set and if it is plural, a set consisting of several entities. Thus, in (38), $[NP_2]$, the semantic value of $NP_2$, is a set containing one or more entities, whereas $[NP_1]$, the semantic value of $NP_1$, is a set of sets, a generalized quantifier:

(38)

$$([except]([NP_2]))([NP_1]) \begin{cases} = \{V \setminus [NP_2] \mid V \in [NP_1]\}, \text{ if for all } V \in [NP_1], \\ \quad [NP_2] \subseteq V. \\ = \{V \cup [NP_2] \mid V \in [NP_1]\}, \text{ if for all} \\ \quad V \in [NP_1], [NP_2] \cap V = \emptyset. \\ = \text{undefined otherwise.} \end{cases}$$

Let us apply (38) first to *every boy except John*. The set {John} is a subset of every set in [*every boy*]; hence subtraction can apply. It will yield as the denotation of *every boy except John* the set containing all sets V\{John}, where V ∈ [*every boy*]. Now let us apply (38) to *no boy except John*. The set {John} has an empty intersection with every set in [*no boy*]; hence addition can apply, and the denotation of *no boy except John* will be the set containing all sets V ∪ {John}, where V ∈ [*no boy*]. What would happen in the case of *some boy except John*? In a model with at least two boys, John and Bill, both the set {John} and the set {Bill} will be in the extension of [*some boy*]; hence the set {John} will be included in some set, but excluded from some other set, in the denotation of *some boy* in that model; hence the Homogeneity Condition will not be satisfied. The denotation of *some boy except John* will be undefined in that model.

I will now show in detail how the three semantic properties of exception constructions can be derived, given (38). We will see that some modification is required in order to fully derive the Quantifier Constraint.

## 4.2. *Deriving the Basic Semantic Properties of Exception Constructions*

### 4.2.1. *Deriving the Negative Condition*

The Negative Condition follows immediately from (38). A generalized quantifier determines which predicates make the sentence true. Hence, if an element is taken away from every set in the generalized quantifier, then, in order for the sentence to be true, this element may not belong to the predicate extension. Likewise, if an element is added to every set in the generalized quantifier, then, in order for the sentence to be true, this element must belong to the predicate extension.

### 4.2.2. *Deriving the Condition of Inclusion*

The Condition of Inclusion logically follows from the Homogeneity Condition:

(39) PROPOSITION. For any determiner D and any sets A and C, if Hom(D(A), C), then $C \subseteq A$.

*Proof*. *First case*: Let A and C be sets such that C is homogeneously included in D(A). Let $X \in D(A)$. Then, by Conservativity, $X \cap A \in D(A)$. Given the assumption, $C \subseteq X \cap A$, and hence $C \subseteq A$. *Second case*: Let A and C be sets such that C is homogeneously excluded from D(A). Assume that $C \not\subseteq A$, i.e., there is a set C′, $C' \neq \emptyset$, $C' = C \backslash A$. Let X be an element of D(A). By Conservativity, $A \cap X \in D(A)$. Since $C' \cap A = \emptyset$, $A \cap X = A \cap (X \cup C')$. Hence, by Conservativity, $X \cup C' \in D(A)$. $C \cap (X \cup C') \neq \emptyset$. Thus, C is not homogeneously excluded from D(A), contradicting the assumption.

So the Condition of Inclusion follows from a semantic analysis of exception NPs which does not mention the restriction of the associated quantifier at all.

### 4.2.3. *Deriving the Quantifier Constraint*

The Homogeneity Condition as incorporated in (38) accounts for the Quantifier Constraint as long as appropriate models are considered. As was mentioned above, in a model with at least two boys, (40a) is ruled out, since [*some boy*] will contain both a set containing John and a set not containing John, and similarly (40b) will be ruled out in a model with more than ten boys:

(40) a. #some boy except John
b. #ten boys except John

Moreover, in a model with more than two boys, (41) will be ruled out:

(41) #most boys except John.

Assuming, following Barwise/Cooper (1981), that *most* roughly means 'more than half', there will be three sets in the denotation of *most students* that include John and one set that excludes him.

Thus, given appropriate models, the Homogeneity Condition rules out inappropriate NPs as the associates of EPs. However, the Homogeneity Condition in (38) is too weak when certain other, smaller models are considered. (40a) will come out as acceptable for a model containing exactly one boy, namely John. Given that model, John will be included in every set in [*some boy*]. Hence subtraction should be applicable. Furthermore, (40b) will come out as acceptable in a model containing exactly ten boys. With respect to this model, John will be included in every set in [*ten students*], hence subtraction should apply. Finally, in a model with only two boys, (41) should be acceptable, since if there are only two boys, neither one constitutes more than half of the boys; hence both have to be included in every set in [*most boys*].

What these examples show is that, if the Homogeneity Condition should imply the Quantifier Constraint, then the Homogeneity Condition should have to be satisfied not only with respect to one particular model, but with respect to certain other models, as well. For (40a, b) and (41), the Homogeneity Condition should then not only be satisfied with respect to the first models (given that they are the intended models), but with respect to the second models, as well.[12]

But which are in general the models with respect to which the Homogeneity Condition should be satisfied?[13]

A first possibility one might consider is that the Homogeneity Condition should be satisfied with respect to **all** models. That is, an exception NP such as $NP_1$ *except John* should be acceptable only if John is included in every set or excluded from every set in the denotation of $NP_1$. But this cannot be right. In models in which John is not a boy (and we do not want John's being a boy to be a logical truth), the Homogeneity Condition will be satisfied neither for *every boy except John* nor for *no boy except John*.

So the Homogeneity Condition should have to be satisfied only for a particular class of models. These models must include models with larger domains than the intended model, and they should meet certain conditions. One of these conditions, clearly, is that the denotations of the predicates in those models should be the same when restricted to the domain of the intended model.

But there are further conditions that have to be imposed on these models having to do with the satisfaction of the presuppositions of the

[12] One might think that, already for pragmatic reasons, (40a) is inappropriate in a model with only one student and (41) in a model with only two students. Given such models, instead of (40a), one would rather say *no boy*, and instead of (41), *one boy but not John*. However, such an explanation would not necessarily apply to (40b) in a model with only ten boys. This holds in particular if the speaker does not know how many boys there are. Even for (40a) and (41), the pragmatic explanation presupposes that the speaker knows exactly how many boys there are; but this certainly need not be the case. Knowledge about the intended model has to be distinguished from the model itself.

[13] This shift from a condition on EPs relative to a given model to a condition involving other models recalls the distinction between local and global constraints on quantifier denotations in the theory of generalized quantifiers (see in particular van Benthem 1987, Westerstahl 1989). A local constraint is a constraint relative to a given universe, a global constraint is a constraint across universes.

EP-complement and EP-associate. For an EP-complement such as *the president* or *the boys*, one should not consider models in which there is not exactly one president or there are no boys. Rather, in the relevant models, the denotation of the EP-complement should be defined whenever it is defined in the intended model.

Unlike the presuppositions of the EP-complement, however, the presuppositions of the EP-associate should not have to be satisfied in the relevant models. The reason is that quantifiers such as *all ten students* or *all of the ten students* accept EPs, but their presupposition, namely that there are exactly ten students, would not be satisfied in any extension of the intended model in which more students have been added. The Homogeneity Condition certainly should be checked in extensions that contain more students than the intended model. It should therefore not be required that the presuppositions of the EP-associate be satisfied in the relevant extensions. This means that *all ten students* will be evaluated simply like *all students* in those extensions, with its presupposition that there are exactly ten students being suspended.

Even though the Homogeneity Condition has to be satisfied in particular extensions of the intended model, it need not be satisfied in submodels. For, reducing the domain without affecting the exceptions will not alter the inclusion or exclusion relations with the exception set.

So the class of the relevant extensions, the 'appropriate extensions' of the intended model (as I will call them), can now be defined as follows: **an appropriate extension** M′ of a model M for an NP of the form '$NP_1$ *except* $NP_2$' is an extension of M such that $NP_2$ has the same semantic value in M′ that it has in M, whereby the presuppositions of $NP_1$ need not be satisfied in M′.

The semantics of exception NPs then has to be restated as follows:

(42)

$$([except]^M([NP_2]^M))([NP_1]^M) \begin{cases} = \{V \setminus [NP_2]^M \mid V \in [NP_1]^M\} \text{ if for every appropriate extension } M' \text{ of } M, \text{ for every } V \in [NP_1]^{M'}, [NP_2]^{M'} \subseteq V. \\ = \{V \cup [NP_2]^M \mid V \in [NP_1]^M\} \text{ if for every appropriate extension } M' \text{ of } M, \text{ for every } V \in [NP_1]^{M'}, [NP_2]^{M'} \cap V = \emptyset. \\ = \text{undefined otherwise.} \end{cases}$$

The analysis I have proposed explains why NPs with *every* and *no* are acceptable as the associates of EPs and why NPs with *some*, *ten*, or *most* are not. However, there are other types of NPs that are candidates for allowing EPs. In the next section, I will show how the proposal accounts for some interesting cases.

## 5. Other Types of NPs as the Associates of EPs

### 5.1. *NPs with Quantified Determiners and Modifiers as EP-associates*

There are two other types of NP which do not obviously denote a universal or negative universal quantifier, but allow for EPs. These are, first, NPs whose determiners are universal or negative universal possessive NPs, as in (43a); and second, inverse-linking constructions where an NP takes a complement denoting a (negative) universal quantifier, as in (43b):

(43) a. Every president's/No president's wife except Hillary Clinton came.

b. The wife of every president/no president except Hillary Clinton came.

The acceptability of EPs in these cases poses a problem for any account in which a quantified NP such as *every president* or *no president* is interpreted outside of the NP, for instance by having moved out of the NP by Quantifier Raising. On such an account, the NP left behind would be interpreted as a definite description containing a variable bound from the outside, as in (44), for the first sentence of (43a):

(44) $\forall x([\mathit{president}](x) \rightarrow [\mathit{come}](\iota y[[\mathit{wife}](y, x)]))$

But *except Hillary Clinton* cannot apply to the denotation of an NP that has the status of a definite description such as sets of the form $\{X \mid \iota y[\langle y, x\rangle \in [\mathit{wife}]] \in X\}$, because then, for all values of x except Bill Clinton, the Homogeneity Condition will be violated.

The applicability of EPs with the NPs in (43) can be accounted for, however, under the assumption that the universal or negative universal NPs in specifier or complement position are interpreted inside the NP.[14] On this view, NPs such as *every president's wife* will denote a generalized quantifier of a certain kind, namely the set of sets X such that for every president x, x's wife is in X, and *no president's wife* will denote the set of sets X such that for no president x, x's wife is in X. These will also be the denotations of *the wife of every president* and of *the wife of no president*, respectively. Thus we get:

[14] This account is in accordance with certain syntactic and semantic analyses in the literature. May (1985) assumes that the complement NP in inverse linking constructions undergoes Quantifier Raising only inside the NP, adjoining to the NP node. Keenan and Faltz (1985) and Keenan and Stavi (1986) proposed the semantic treatment of inverse-linking NPs that I adopt.

(45) [*every president's wife*]
$= \{P \mid \forall x([\textit{president}](x) \rightarrow P(\iota y[\textit{wife}]\langle y, x\rangle))\}$

With these denotations, the Homogeneity Condition is satisfied with respect to the set {Hillary Clinton}. Applying subtraction to the quantifier in (45) will yield the set $\{V \setminus \{H.C.\} \mid V \in [\textit{every president's wife}]\}$ as the denotation of *every president's wife except Hillary Clinton*.

The acceptability of EPs with the NPs in (43) shows an important general fact about natural language: even for sentences representable by only first-order quantifiers, natural language may require generalized quantifiers. The first-order representation of (43a) in (44) does not provide an appropriate semantic object for the EP to operate on; only the generalized quantifier in (45) does.[15]

### 5.2. *Definite NPs as the Associates of Exception Phrases*

Definite plural NPs provide a case where EPs operate at the level of implications.

Definite plural NPs such as *the men* have often been considered equivalent to universal quantifiers (e.g. in Barwise/Cooper 1981). However, they are significantly less acceptable with EPs than universally quantified NPs. This holds not only for definite plurals that can be considered specific, as in (46a), but also definite plurals which are nonspecific, as in (46b):

(46) a. #The boys but John/except John came.
b. #The boys in this class but John/except John came.

The alternative view of definite plurals, and in fact the more generally accepted view, is that definite plurals are not quantified NPs at all, but rather referential NPs referring to groups, namely the maximal groups of entities satisfying the corresponding singular N′ (cf. Link 1983, Krifka 1992). If this is so, then EPs with singular EP-complements should not be

[15] A further piece of evidence for my account of the denotation of *every president's wife* comes from data with variable-binding. As is well-known, a quantified NP in specifier position can bind a pronoun, as in (1a). However, when the entire NP is modified by an EP, as in (1b) such pronoun binding is hard to get. This follows if (1b) obligatorily has to be analysed as in (1c) in order for the pronoun to be properly bound:

(1) a. *Every president's* wife thinks that *he* is a genius.
b. *Every president's* wife except Hillary Clinton thinks that *he* is a genius.
c. For all x, x a president, the wife of x thinks that x is a genius.

Thanks to a reviewer for bringing these examples to my attention.

able to apply at all, since EPs do not generally apply to a group of entities taking away or adding a member to that group.

However, there is one type of exception construction with definite plural NPs that is acceptable, namely where *except for*-phrases occur in adverbial position, as in (47):

(47) The boys came except for John.

A plausible explanation for the acceptability of (47) is that here the EP does not apply to the denotation of the NP *the boys*, but rather operates at the level of implications, a phenomenon discussed earlier in Section 2.3. At that level, the predicate *came*, which is interpreted distributively, will yield a universal quantifier ranging over the members of the group the predicate is predicated of; and this is a quantifier the EP can apply to.[16] Let us assume that G is an appropriate operation mapping a set to the group composed of the members of the set (for whatever notion of group one may adopt). Then a definite plural NP such as *the boys* will have the denotation G([*boy*]). As an evaluation of (47), we get (48), where $<$ is an appropriate part relation, relating members to a group:

(48) [*except for John*](EVERY({x | x $<$ [*the boys*]})([*came*])

(47) then belongs to the same class of phenomena as (17a), repeated here as (49), where the EP relates to an implied universal quantifier ranging over the parts of the house:[17]

(49) Except for the door John painted the house red.

The view that definite plural NPs refer to groups now requires a slight modification of the treatment of EPs where the EP-complement is a plural NP, as in (50):

(50) every boy except the boys in this class

[16] I here assume that distributivity is a matter of the lexical meaning of the predicate, rather than being a matter of the presence of a tacit distributive quantifier in the sentence meaning. See Moltmann (to appear b) for an extensive discussion.

[17] As was pointed out to me by Kit Fine, EPs may even associate with definite plurals with a collective predicate, as in (1a), though with some collective predicates the result is degraded, as in (1b), noted by a reviewer:

(1)a. The boys played basketball together except for Bill.
b. #The rocks rained down except for this one.

In (1a) the EP seems to apply to a 'universal procedure' for forming a collective agent of an event, rather than a universal quantifier. I would assume that this, again, takes place, in some way, at the level of implications.

If *the boys in this class* in (50) refers to a group, then in order to apply the exception operation of subtraction to the sets in the denotation of *every boy*, the **group** of the boys in this class has to be replaced as the denotation of *the boys in this class* by the **set** of boys in this class. Let g be a function mapping a group of entities onto the set composed of the atoms of this group ($g(x) = \{y \mid y \in ATOM(x)\}$). Then the formulation of the semantics of EPs as given in (38) is to be modified by replacing '[$NP_2$]' (which, recall, denotes a set) by 'g([$NP_2$])'.

In order to give some independent support to the view that EPs may operate at the level of implications, let me present two other cases, both of which involve *only*.

In the first case, a free EP occurs in a sentence with an NP modified by *only*:[18]

(51) a. Only boys came except for Mary.
b. Only John came except for Bill.

Again, the free EP here operates at the level of implications. (51b) without the EP is equivalent to (52a), where a universal quantifier ranges over the

[18] At this point the question arises whether NPs modified by *only* allow for EPs. The data here seem somewhat messy. All speakers dislike (1a) and (1b), but some accept (1c) (Bill being one of John's sons):

(1) a. #Only boys except Mary left.
b. #Only John except Mary left.
c. (#)Only John's sons except Bill left.

On one view of *only* as an NP-modifier, the badness of (1a–c) might be unexpected. On this view, *only boys* denotes the set $\{V \mid V \subseteq [boy]\}$, *only John* denotes the set $\{\{John\}\}$ and *only John's sons*, arguably, the set $\{\{x \mid \langle x, John\rangle \in [son]\}\}$. With all three sets the Homogeneity Condition is satisfied by {Mary} and, for (1c), by {Bill}; hence addition and, in the case of (1c), subtraction should be able to apply and provide sensible interpretations.

With such a view of *only*, however, the badness of (1a) may be attributed to the following pragmatic condition: the cardinality of the exception set must be smaller than any set in the associated quantifier it is added to or subtracted from. (This is the Minority Condition introduced in Section 6). The denotation of *only boys* includes the empty set, and for this set the Minority Condition would be violated. Also (1b) might still fall under this explanation.

On another view of *only* (which was pointed out to me by a reviewer) the badness of (1b) and (1c) can be explained (in addition to the unacceptability of (1a)). On this view, the implication of (1b) that John left and of (1c) that John's sons left constitute only presuppositions and hence do not form part of the denotation of the *only*-phrases. Then, the denotation of *only John* is $\{\{John\}, \emptyset\}$ and the denotation of *only John's sons* $\{V \mid V \subseteq \{x \mid \langle x, John\rangle \in [son]\}$. Now the Minority Condition applies and rules out (1b) and (1c).

Given the two views of *only*, which (supplemented by the Minority Condition) differ only in their predictions about (1c), one may speculate that those speakers who accept (1c) simply take the first, not the second, view of *only*.

VP denotation and hence provides a quantifier for the EP to apply to, yielding (52b), and similarly for (51a) and (52c):

(52) a. (EVERY([*came*]))([*boys*])
b. ([*except*]({Mary}))((EVERY([*came*]))([*boys*]))
c. ([*except*]({Bill})))((EVERY([*came*]))({x | x = John}))

The other case where an EP operates at the level of implications is (53a), as opposed to (53b), an example given by Hoeksema (1987, 1992) (who explains it differently):

(53) a. Except for Bill, John is the only realtor.
b. #Except for Bill, I met the only realtor.

(53a) without the EP is equivalent to 'for every realtor x, x = John', which provides a universal quantifier for the EP *except for Bill* to apply to. By contrast, no such quantifier can be construed for (53b), and hence the EP will be vacuous semantically.

### 5.3. *Wh-phrases as the Associates of Exception Phrases*

Like definite NPs, wh-phrases in interrogatives also allow for free EPs, though not for connected EPs:

(54) a. #Mary knows which students except John passed the exam.
b. Except for John, Mary knows which students passed the exam.

In current theories, wh-phrases are generally not construed as universal quantifiers. Rather, they are construed, for instance, as existential quantifiers in Karttunen's (1977) theory and as syncategorematic elements, and hence not quantifiers at all, in Groenendijk and Stokhof's (1984) theory. But in both theories, interrogative sentences are equivalent to sentences involving universal quantification. Within Karttunen's theory (which is based on weak exhaustiveness) (55a) is equivalent to (55b) and within Groenendijk and Stokhof's theory (which is based on strong exhaustiveness) to (55c):

(55) a. Mary knows which students passed the exam.
b. For every student x who passed the exam, Mary knows that x passed the exam.
c. For every student x, Mary knows whether x passed the exam.

Given either the theories of interrogatives such as Karttunen's and Groenendijk and Stokhof's, the EPs in (54) can be evaluated only at the level of implications, as represented by (55b) and (55c), which both provide universal quantifiers for the EP to operate on. Note that (55b) and (55c) do not fare the same with respect to providing the appropriate quantifier for the EP. (55c) does not imply that John passed the exam. Hence John will satisfy the Homogeneity Condition only for the quantifier 'for every student' in (55c), not for the quantifier 'for every student who passed the exam' in (55b). Thus, EPs provide a new criterion for evaluating Karttunen's and Groenendijk and Stokhof's theory of interrogatives.

This concludes the discussion of NPs that EPs may associate with. I will now draw the attention to the EP-complement, which may take the form of a range of NPs other than just definite NPs, as discussed so far.

## 6. Extending the Analysis to Quantified and Disjoined Complements of Exception Expressions

### 6.1. *Quantified Complements*

As was mentioned earlier, EPs allow for quantified complements of *except* or *but*:

(56) every student except one/at most two/exactly two

In this section, I will show that the analysis proposed so far can be extended in a rather straightforward way to account for quantified EP-complements.

First, however, let me briefly discuss a potential alternative account of the data in (56) which would preserve the analysis of simple exception constructions. On this account the data in (56) would be considered cases of simple exception constructions where the *except*-complement takes wide scope and *except* applies to the value of a variable. Thus, (57a) would be taken as equivalent to (57b):

(57) a. Every student except one solved the problem.
b. For one x, every student solved the problem except x.

If this were correct, then the data in (56) could be handled simply by applying the analysis of simple exception constructions in (38) to an EP containing a variable.

However, there are problems with this proposal. First, quantified *except*-complements behave differently from quantified NP-modifiers taking wide scope (inverse linking). The difference shows up first with decreasing quantifiers, which may not take wide scope, but can act as complements of *except*:[19]

(58) a. No student except at most two solved the problem.
b. #No representative of at most two countries came to the meeting.

(58b) is impossible in a reading in which *at most two countries* takes scope over *no representative*.

Second, the difference shows up in the fact that inverse linking is (for some reason) impossible with NPs modified by *possibly*, as in (59a), whereas such NPs may act as EP-complements, as in (59b):[20]

(59) a. Somebody from possibly every city was present.
b. Every student except possibly one solved the problem.

Another problem with the proposal is that a paraphrase such as (57b) for (57a) does not work for all cases. For instance, it gives the wrong result for (60a), namely (60b), which falsely implies that there is at most one exceptional student:[21]

(60) a. Every student except at most two solved the problem.

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[19] Inverse linking with decreasing quantifiers is possible only with certain NPs such as bare plurals and definites, as pointed out by a reviewer:

(1) a. Members of at most three clubs were present.
b. The students of at most three universities were represented.

[20] Exception NPs such as *every boy except possibly John* involve epistemic possibility. They can perhaps best be analysed within a semantics which is based on the notion of an information state such as Data Semantics (cf. Veltmann 1984, 1986) (see Section 7). On such an account, *every boy except possibly John came* may be paraphrased in the following way: in the present information state s (whose domain does not include John), it is the case that every boy came; and in some extension s′ of s whose domain includes John, it is the case that every boy except John came. The problem is, however, how to obtain such a meaning of the sentence in a compositional way, a problem which I have to leave open for further research.

[21] One way of rescuing the account might be to analyse plural quantifiers such as *at most two* as cardinality attributes. Then (60b) would be replaced by (1):

(1) For a set X such that X has at most two students as members, every student except X solved the problem.

However, such an analysis of quantifiers like *at most two* runs into problems in other contexts such as (2):

(2) At most two students solved exactly two problems.

(2) does not mean that there is a group X having at most two students as members such that X solved exactly two problems. Rather, it says that the maximal number of individual students that solved exactly two problems is at most two.

b. For at most two x, every student except x solved the problem.

Thus, a general reduction of the constructions in (56) to simple exception constructions with wide scope *except*-complements fails. The quantified complements of *except* should instead be treated 'in situ'; more precisely, the denotation of *except* should be conceived of as an operation mapping a generalized quantifier onto a function from generalized quantifiers to generalized quantifiers.

The way of extending the analysis to quantified EP-complements is to have the exception operation apply **pointwise** to the elements in a particular set of sets obtained from the denotation of the complement of *except*. Let us first consider the case of quantified NPs such as *one*(*boy*). I will later come to the question of what in general the range of possible EP-complements is. For the denotation of *one* (*boy*), this set will be {{John}, {Bill}}. The exception operation now applies to both elements in this set by first subtracting the set {John} from each of the sets in the denotation of *every boy*, yielding a set of sets $X_1$; and second, subtracting the set {Bill} from each of those sets, yielding a set of sets $X_2$. After this, set union will apply to $X_1$ and $X_2$, yielding the denotation of *every boy except one*. This denotation is the same as for *every boy except John* or *every boy except Bill* in the model in question, which is the desired result.

In order to implement this analysis technically, I first introduce two notions required to get the set {{John}, {Bill}} from the denotation of *one boy* (in the relevant model). The first notion is the notion of a live-on set, as defined in Barwise/Cooper (1981):

(61) A quantifier Q *lives on* a set A iff (for every set X, $X \in Q$ iff $X \cap A \in Q$).

A live-on set for the quantifiers denoted by *every boy*, *no boy*, and *one boy* is any set containing the set of boys as a subset.

The second notion I will introduce is the notion of a witness set (which is defined in a slightly different way than in Barwise/Cooper 1981):

(62) A set w is a *witness set* for a quantifier Q iff for the smallest live-on set A of Q, $w \subseteq A$ and $w \in Q$.

The quantifier denoted by *every boy* has the set of all boys as its only witness set, the quantifier denoted by *one boy* has all the singleton sets of boys as its witness sets, and the quantifier denoted by *at most two boys* all sets consisting of at most two boys.

As part of the meaning of an exception construction, the denotation of the EP-complement will be mapped onto the set of the witness sets by the function W defined below:[22]

(63) $W(Q) = \{w \mid w \text{ is a witness set for } Q\}$

Thus, we will get $W([one(boy)]) = \{\{John\}, \{Bill\}\}$ (in the model under consideration).

The denotation of *every boy except one* can now be given as in (64):

(64) $[every\ boy\ except\ one] = \bigcup_{V' \in W([one(boy)])} \{V \setminus V' \mid V \in [every\ boy]\}$

Of course, also exception NPs of the form *every boy except John* or *every boy except the boys in this class* can be analysed in this way, taking *John* and *the boys in this class* to denote generalized quantifiers (principal filters generated by the singleton set containing John and the singleton set containing the group of boys in this class).

In order to generalize the formal semantics of EPs appropriately, we have to first answer the question of how the Homogeneity Condition is satisfied by quantified EP-complements. A simple answer can be given as follows: If $NP_2$ is the EP-complement and $W([NP_2])$ contains more than one set, then the Homogeneity Condition is satisfied iff either every set in $W([NP_2])$ is included in every set in $[NP_1]$ or every set in $W([NP_2])$ is excluded from every set in $[NP_1]$. As usual, this condition has to be satisfied with respect to every appropriate extension of the intended model. Thus, both sets in $W([one\ boy])$ are subsets of every set in [*every boy*] (in every appropriate extension of the intended model). Hence the Homogeneity Condition is satisfied.

So the more general definition of the semantics of EPs is:

[22] The operation W is similar, though distinct, from the exhaustivization operation exh that Groenendijk and Stokhof (1984) employ to ensure the exhaustiveness of constituent answers. exh maps a quantifier onto the set of its minimal elements, which allows *John* as an answer to *who came*? to be interpreted as 'only John' (which amounts to a complete list of people who came). For quantifiers such as *every boy* or *John* exh will yield the same result as W. However, the two operations exh and W yield different results in many cases, e.g. for plural quantifiers such as *few*, *at most two*, or *at least two*. exh maps *no* N′, *few* N′ and *at most two* N′ all onto the empty set, an undesirable result. As a remedy, Groenendijk and Stokhof stipulate that plural quantified NPs such as *few* N′ and *at least two* N′ quantify over groups with at least two members. This, however, predicts obligatory group readings for those quantfiers that are in fact not present. For instance, *at most two students found two solutions* allows for two students to have found a different two solutions. The operation W does not run into those problems.

(65)

$$([\mathit{except}]^{M}([NP_2]^{M})([NP_1]^{M}) \begin{cases} = \bigcup_{V' \in W([NP_2]^{M})} \{V \setminus V' \mid V \in [NP_1]^{M}\}, & \text{if for every appropriate extension } M' \text{ of } M, \\ & \text{for every } V \in [NP_1]^{M'} \text{ and for every} \\ & V' \in [NP_2]^{M'},\ V' \subseteq V. \\ = \bigcup_{V' \in W([NP_2]^{M})} \{V \cup V' \mid V \in [NP_1]^{M}\}, & \text{if for every appropriate extension } M' \text{ of} \\ & M, \text{ for every } V \in [NP_1]^{M'} \text{ and for} \\ & \text{every } V' \in [NP_2]^{M'},\ V' \cap V = \emptyset. \\ = \text{undefined otherwise.} & \end{cases}$$

This analysis is general enough to account for all kinds of quantified EP-complements. However, as it turns out, not all quantified NPs are actually acceptable, for example, NPs of the form *at least* N′:

(66) #every boy except at least two

The unacceptability of *at least two* in (66), however, can be attributed to a plausible general constraint on exception NPs, namely that any potential exception set (that is, in (66), any element of W([*at least two* (*boys*)])) be of lesser cardinality than the restriction of the quantifier, that is, in (66) the set [boy]:

(67) *The Minority Requirement*
For any model M, [*except* $NP_2]^{M}([NP_1]^{M})$ is defined only if for every $V \in W([NP_2]^{M})$, $|A| > |V|$, where A is the smallest live-on set of $[NP_1]^{M}$.

There are other constraints on the EP-complement which are more mysterious and require further research. Certain types of quantified NPs are bad even when the Minority Requirement is satisfied, for instance, *every Texan* and *less than five*, even though these NPs should provide the same (potential) exception sets as *the Texans* and *at most four* (and *at most four* and *less than five* even denote exactly the same quantifiers):[23]

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[23] An important observation, pointed out to me by Anna Szabolsci, is that the constraints on the EP-complement appear to be the same as the constraints on the NPs that may be modified by *only* (or *at most*):

(1) Only John/John or Bill/two students/at most two students/the students/#every student/#at least two students/#less than two students came.

This points to the fact that *only*-NPs are equivalent to exception NPs of a certain sort (*only John* being synonymous with *nobody except John*). The NP following *only* plays the same role as the EP-complement in an exception NP. Thus, the two phenomena may ultimately fall under the same explanation.

(68) a. #every American except every Texan
b. every American except the Texans
(69) a. #every boy except less than five
b. every American except at most four

### 6.2. *Disjoined Complements*

Exception constructions also allow for disjoined complements:

(70) a. Every boy except John or Bill got an A.
b. I will vote for anybody except a racist or a terrorist.

It is tempting to simply carry over the account of quantified EP-complements to disjoined ones. But unfortunately this would give wrong results for both (70a) and (70b). As the reader may verify by applying (65), such an account would render (70a) equivalent to *every boy except John or every boy except Bill or every boy except John and Bill got an A* (given the standard assumption that disjunction is inclusive). However, (70a) does not allow for a reading in which both John and Bill got an A. Moreover, the account could not apply to the most prominent, conjunctive reading of (70b), where it is equivalent to 'I will vote for anybody except any racist and any terrorist'.

A solution to the problem with disjunction may be found in the approach to disjunction scope of Higginbotham (1991). According to this account, *or*, when coordinating NPs, forms the restriction of a tacit wide scope quantifier (or overt *either*) which is either an existential quantifier (in (70a)) or a universal quantifier (namely in generic or modal contexts such as (70b)). On such an account, (70a) is to be paraphrased as (71a), and (70b) as (71b):

(71) a. For some x [x = John or x = Mary], everybody except x got an A.
b. For every x [racist(x) or terrorist(x)], I will vote for anybody except x.

(71a) is adequate for (70a). But unfortunately, (71b) is not equivalent to (70b). Suppose there is both a racist a and a terrorist b (where a ≠ b), then (71b), unlike (70b), is false, since 'I will vote for anybody except a' and 'I will vote for anybody except b' cannot both be true.

The source of this difficulty may not lie so much in the account of *or*, but rather in the view of generic sentences, which (70b) is an instance of. The difficulty disappears if one adopts a different, situation-based view of generic sentences (cf. Moltmann 1992b). On this view, generic sentences such as (70b) do not involve quantification over individuals, but rather over situations, which may be restricted by appropriate parts of the sentence or by the nonlinguistic context. In particular, in (70b), *a racist or a terrorist* as in (70b) may form the restriction of the generic operator ranging over situations. Crucially, given that these situations may be subject to further contextual restrictions, they may all contain only a terrorist or only a racist. So on this view, (70b) can be paraphrased as 'for any situation s such that there is a racist in s or a terrorist in s, I will vote for anybody except the racist or the terrorist in s'.

## 7. Applying the Analysis to Clausal Exception Constructions

There are a number of exception constructions in English in which the complement of *except* is a clause. In this section, I want to show how the semantic analysis of exception constructions that I have proposed can be applied to some important types of clausal exception constructions.

In the first construction, *except* is followed by a *that*-clause, as in (72a), or more generally by a subordinate clause such as in (72b); in the second construction, *except* is followed by a clause without complementizer, as in (72c) and (72d); the third construction consists of *unless*-clauses and *except if*-clauses, as in (72e):

(72) a. John knows everything except that Mary left the country.
b. John is always happy except when it is raining.
c. Every student got an A, except John got a B.
d. Every man danced with every woman except John kicked Mary.
e. John won the race unless Bill won it/except if Bill won it.

(72a) and (72b) are easy. The EP in (72a) specifies a fact as the exception and applies to a quantifier ranging over facts. In (72b), the EP specifies time intervals as the exceptions and applies to a quantifier ranging over such intervals.

Clausal exception constructions of the type in (72c) and (72d) are more complicated. Generally, they can be analysed by construing an implicit universal quantifier ranging over propositions at the level of implications. Let us make the not implausible assumption that what every student except John got was only an A (in the relevant situation). Then (72c) without the EP can be paraphrased as follows: for every proposition of the form 'x got y', where x is a student, it is the case that y is an A. Thus, the proposition expressed by (72c) without the EP is as in (73a). This proposition can systematically be mapped onto a proposition with a universal quantifier ranging propositions to which the EP can apply as in (73b), where 'p' is a variable ranging over proposition:

(73) a. [*every student*]({x | [[*an A*]({y | [*got*](x, y)})]})
b. ([*except*]({[*John got a B*]}))(EVERY({p | ∃xy([*student*](x) & p = ^[*got*](x, y) & true(p))]}))({p | ∃xy([*student*](x) & [A](x) & p = ^[*got*](x, y) & TRUE(p))}

Similarly, the proposition expressed by (72d), as roughly given in (74a), can be mapped onto the proposition represented in (74b) with a universal quantifier ranging over propositions. C here restricts R to relevant relations between men and women:

(74) a. EVERY([*man*])({y | (EVERY([*woman*])({y | [*danced with*](x, y)})})
b. ([*except*]({[*John kicked Man*]}))(EVERY({p | ∃Rxy(C(R) & [*man*](x) & [*woman*](y) & p = ^R(x, y) & true(p)}))({p | ∃xy([*man*](x) & [*woman*](y) & p = ^[*danced with*](x, y) & TRUE(p))})

This analysis, in a way, treats (72c) and (72d) as focus constructions with *an A* being in focus in (72c) and *danced with* in (72d) (cf. Rooth 1985). If *an A* and *danced with* are foci, we get background meanings (Rooth's p-sets), which provide the ranges for the universal propositional quantifiers in (73b) and (74b).

A good semantic framework for analysing *unless*-clauses as in (72e) is Data Semantics (cf. Veltman 1984, 1986).[24] Data Semantics uses as a

[24] There is also a way of treating *unless*-clauses in terms of truth-value functions (as was suggested to me by Jeroen Groenendijk, p.c.). (See Groenendijk/Stokhof (1984, Chapter 5) for a formally related treatment of answers with *yes* and *no* and with conditionals.) *Unless* clauses, on this account, apply to an implicit sentential operator, namely an implicit affirmative operator 'yes' (which corresponds to λp[p]). The *unless*-clause in (72e) (and more perspicuously the *if*-clause) expresses λp[Bill won it → p]. Extensionally, λp[p] corresponds to the singleton set of the truth value 'true', i.e. {1} (= {{{ }}}). λp[Bill won it → p] corresponds to {1} if Bill won the race and to {1, 0} if Bill did not win the race. The identification of the affirmative operator and the *unless*-clause with a set of truth values allows subtraction and addition to apply as with other exception constructions.

If Bill won the race, the *unless*-complement will denote {1}; hence every element in {1} is subtracted from every element in {1}. This gives the set containing just { }\{ } (= { }), that is, the set {0}. Thus, it has to be the case that John did not win the race.

Now suppose that Bill did not win the race. Then the *unless*-clause denotes {0, 1}. Application of W to this set (given that the relevant universe consists in 0 and 1) yields the set {0}). Addition of this set to the elements in {1} yields {1 + 0} = {1}. Hence, it has to be the case that John won the race.

However, for the same reasons as for indicative conditionals, a truth-functional analysis of *unless*-clauses will ultimately not be adequate.

primitive the epistemic notion of an **information state**, that is, a set of facts which represent the current information shared by speaker and addressee. Data Semantics uses a structure $(\mathbf{S}, <)$, where $\mathbf{S}$ is a set of information states and $<$ a partial ordering among the elements of $\mathbf{S}$. A sentence S holds relative to an information state s ($s \models S$) just in case S is true on the basis of the evidence available in s. On this approach, the semantics of indicative conditionals is as follows: a sentence of the form 'if P, Q' is true in an information state s iff for any extension of s in which P holds, Q holds as well:

(75) $s \models$ *If* P, Q iff for any extension $s'$ of s, either not $s' \models P$ or $s' \models Q$.

In order to account for *unless-* and *except if*-clauses, I will use a logical property shared by many propositions (including the propositions that John won) namely **persistence**. A proposition p is persistent iff the following holds: If p is true in an information state s, then p is true in every extension of s. What is crucial for the treatment of *unless*-clauses is that a proposition which is persistent allows a universal quantifier ranging over the extensions of s to be construed at the level of implications. The idea is that *unless*-clauses act as EPs applying to this quantifier. If the clause is of the form *unless* Q, then it takes away the extensions of s at which Q holds. Thus, we have:

(76) $s \models$ P *unless* Q
iff $([except](\{s \mid s \models Q\}))$ $(\text{EVERY}(\{s' \mid s < s'\})$ $(\{s' \mid s' \models P\})$.

As a corollary of this proposal, we derive a difference between sentences with *must* as an epistemic modal (which allow for *unless*-clauses) and sentences with epistemic *may* (which do not):[25]

(77) a. John must have won the race unless Bill won it.
b. #John may have won the race unless Bill won it.

The semantics of epistemic *may* and *must* in data semantics is as follows (cf. Veltman 1986):

(78) a. $s \models$ *may* P iff for some $s'$, $s < s'$, $s' \models P$.
b. $s \models$ *must* P iff for every $s'$, $s < s'$, there is some $s''$, $s' < s''$ such that $s'' \models P$.

[25] It should be emphasized that the analysis only accounts for epistemic modals. *Unless*-clauses are fine with *may* as a deontic modal, as was pointed out by a reviewer:

(1) You may join the army, unless you are under-age or openly gay.

That is, a sentence *may* P is true in an information state s if P is true in some extension of s, and a sentence *must* P is true in an information state s if P is true in some extension of every extension of s. Obviously, *must* P is persistent, but *may* P is not.

Let me summarize. In this part of the paper, I have presented a new semantic analysis of exception constructions which overcomes the shortcomings of previous proposals. This analysis was first presented in its basic form and shown to apply to a variety of exception constructions with different nominal and clausal EP-associates and EP-complements. One important further assumption of the account was that EPs may be evaluated not at the level of the compositional analysis of sentence meanings proper, but rather at a level of implications. In those cases, only a 'restructuring' of the meaning of the sentence without the EP yields an appropriate semantic object for the EP to operate on.

## PART II. POLYADIC QUANTIFICATION IN EXCEPTION SENTENCES

The exception constructions which I have discusssed so far all had in common that the quantifier that the EP associated with was a monadic quantifier, a set of sets. In this part of the paper, I will show that EPs may also take as their associates polyadic quantifiers, that is, quantifiers that are sets of relations.

Polyadic quantification with EPs manifests itself in two ways. First, EPs may specify an n-tuple of entities (or a set of n-tuples) as the exception. This holds for three different types of EPs that can be found in English: *except*-phrases with a construction similar to Gapping, a construction with multiple occurrences of *else*, and *otherwise*. Second, there are data where the constraint on the EP-associate seems not to be a local restriction that has to be met just by a single NP, but rather a global restriction, which may be met only by the larger linguistic context in which the NP occurs. I will argue that those constructions also involve a polyadic quantifier as the true associate of the EP.

## 1. Polyadic Quantification with Pseudogapped Exception Phrases

### 1.1. *The Data*

In many languages, EPs may occur with what seems to be Gapping. Since this construction, however, is distinct from true Gapping, I will call it 'Pseudogapping'.[26] In this construction, *except* is followed by a sequence of NPs or PPs:[27,28]

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[26] I use the term 'Pseudogapping' here in a nonstandard way. Commonly, the term is used for constructions such as (1):

(1) John ate more apples than Mary did pears.

[27] Exception constructions with Pseudogapping as in (1) exhibit certain characteristic properties of Gapping; in other respects they differ from Gapping. For example, like in true Gapping constructions, the constituents in the EP-complement have to be major constituents (i.e. daughters of IP or VP), as seen in the following examples from German:

(1)a. weil jeder Student an jeder Universitaet studiert hat, ausser Hans * (am) MIT
because every student at every university studied has except John (at) MIT
b. weil jeder das Geheimnis von jedem kennt, ausser Hans * (das Geheimnis) von Maria
because everybody the secret of everybody knows except John (the secret) of Mary

Furthermore, in the exception constructions with Pseudogapping, 'extraposition' of the EP is obligatory:

(2)a. *Jeder Mann ausser Hans mit Maria hat mit jeder Frau getanzt.
every man except John with Mary has with every woman danced
b. *Jeder Mann hat mit jeder Frau ausser Hans mit Maria getanzt.
every man has with every woman except John with Mary danced

Pseudogapping with EPs, however, differs from Gapping in crucial respects. First of all, unlike true Gapping, the constituents associated with the exception expression need not be separated by an intonation break. Second, unlike true Gapping, Pseudogapping with EPs does not require focusing of the 'correlates' and the 'remnants'. Finally, Pseudogapping with EPs is subject to stricter locality conditions than true Gapping. In the latter case, the remnants may be separated by a finite clause boundary with only a mild degradation in acceptability. But this is impossible with Pseudogapping, which strictly prohibits the correlates from being separated by a clause boundary:

(4)a. *Every man said that he danced with every woman except John with Mary.
b. ?John said that he danced with Sue and Joe with Mary.

[28] English disallows a sequence of two or more NPs following *except*. Only the first phrase may be an NP; any other phrases have to be PPs or adverbs:

(1)a. *Every man met every woman except John Mary.
b. *Every man showed every woman every book except John Mary the bible.
c. Every man danced with every woman in every room except John with Mary in the kitchen.

This restriction seems to be a peculiarity of English, rather than being a general fact about the exception construction itself. There are languages, for instance German, in which the

(1) a. Every man danced with every woman except John with Mary.
b. No man danced with any woman except John with Mary.
c. Every man danced with every woman every day except John with Mary yesterday.
d. No man ever danced with any woman except John yesterday with Mary.

What is crucial about the exception sentences in (1) is that they are not generally equivalent to clauses where multiple EPs associate with single phrases. Thus, (1a) is not equivalent to (2a), and (1b) is not equivalent to (2b):

(2) a. Every man except John danced with every woman except Mary.
b. No man except John danced with any woman except Mary.

(1a) has different truth conditions from (2a). For instance, (1a) implies that John did not dance with Mary, whereas (2a) is compatible with John having danced with Mary. Furthermore, (1a) implies that every man other than John danced with Mary, and every woman other than Mary danced with John, whereas (2a) implies that every man other than John did not dance with Mary and every woman other than Mary did not dance with John.

The difference in truth conditions follows if pseudogapped exception constructions are not interpreted by multiple exception operations on **monadic quantifiers**, but rather by a single exception operation on a **polyadic quantifier**. That is, in (1a), the semantic operation associated with *except* does not subtract John and Mary from the set in the denotations of [*every man*] and [*every woman*] individually, but rather subtracts the pair ⟨*John*, *Mary*⟩ from the relations in a dyadic quantifier, namely the

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restriction does not hold:

(2) Jede Frau sah jeden Mann ausser diese Frau diesen Mann.
every woman (NOM) saw every man (Acc) except this (Nom) this man (Acc)

I do not have an answer to the question why the restriction holds in English and not in German. At first sight, it looks like the difference between English and German has to do with conditions on Case assignment. In English, it appears as if an NP-complement of *except* has to receive case from *except*, which can assign case to only one NP, whereas in German an NP-complement of *except* may, in some way, receive case from the main verb.

However, this explanation becomes less plausible in view of the fact that phrases introduced by *even* in a parallel construction display the same constraint:

(3) a. Every man danced with every woman even John with Mary.
b. *Every man admired every woman even John Mary.

*Even* certainly does not assign Case; NPs modified by *even* still need case from some other case-assigning category.

quantifier which can be considered the denotation of the (discontinuous) sequence ⟨*every man*, *every woman*⟩ (see Section 5 for more discussion). This quantifier is a universal quantifier ranging over all pairs consisting of a man and a woman; more precisely, it is the set of all relations containing the Cartesian product [*men*] × [*women*] as a subset.

In the semantic evaluation of the exception constructions in (1) basically the same conditions and operations apply as applied in the monadic case, except that they involve n-tuples and relations, rather than individuals and sets. Thus, the EP *except John with Mary* specifies the pair ⟨*John*, *Mary*⟩ as the exception, which satisfies the Homogeneity Condition by being included in every relation in the dyadic quantifier [⟨*every man*, *every woman*⟩]; hence subtraction can apply and take away ⟨*John*, *Mary*⟩ from every relation in that set, yielding as the denotation of the sequence ⟨*every man*, *every woman*, *except John with Mary*⟩ the set {R\{⟨*John*, *Mary*⟩} | R ∈ [⟨*every man*, *every woman*⟩]}. The meaning of (1a) then is:[29]

(3) [*danced with*] ∈ {R\⟨John, Mary⟩} | R ∈ [⟨*every man*, *every woman*⟩]}

Before going further into the issue of polyadic quantification with exception constructions, I have to discuss a potential alternative analysis of the data in (1), which is not based on polyadic quantification.

[29] As was pointed out to me by Stanley Peters, exception sentences with symmetric predicates such as *resemble* and even *dance with* may be a problem for this analysis. Generally, if a pair ⟨x, y⟩ is in the extension of *resemble* or *dance with*, then also the pair ⟨y, x⟩ in the extension. Hence if ⟨John, Mary⟩ is an exception with respect to the claim that every man danced with every woman, then also ⟨Mary, John⟩ is an exception. So both pairs should be taken away from the relations in the quantifier (EVERY MAN, EVERY WOMAN). But this would require that *John with Mary* in those cases actually denotes the set {⟨John, Mary⟩, ⟨Mary, John⟩}. Two problems then arise. First, the Condition of Inclusion would be violated since Mary is not a man and John not a woman. Second, *John with Mary* would then have to have a different denotation when the predicate is not symmetric as in (1):

(1) Every man was annoyed with every woman except John with Mary.

Clearly, compositionality should not allow the denotation of *John with Mary* to depend on the predicate in the main clause. Thus, it is better to keep the asymmetric denotation for *John with Mary*. Applying the exception operation to the converse pair in the case of symmetric predicate is perhaps best considered a matter of accommodation, rather than part of what exception constructions mean.

One might think of another way of getting around the problem with symmetric predicates. It has been noted that so-called symmetric predicates are not always symmetric, for instance, John may have danced with a doll, but the doll could not have danced with John. However, the potential asymmetry of 'symmetric' predicate does not solve the problem. The semantics of EPs involves only extensions of predicates. In a universe in which there are only equally active people, the extension of *dance* may be completely symmetric; hence the problem remains.

### 1.2. *An Alternative Analysis as Clausal Exception Constructions*

The examples in (1) could be considered standard cases of Gapping and as such they could be analysed as clausal exception constructions in which the EP specifies a proposition as the exception and the matrix sentence represents an implicit universal quantification over propositions. On this view, (1a) would be a reduced form of (4a), which could be evaluated as in (4b), with a negative universal quantifier ranging over propositions of a certain form:

(4) a. No man danced with any woman except John danced with Mary.

b. (([*except*]([*John danced with Mary*]))(NO({p | ∃x∃y(man(x) & woman(y) & p = ^x danced with y)})))(TRUE)

(4b) does not involve polyadic quantifiers; it only involves a monadic quantifier, which ranges over propositions. (4b), thus, suggests a general way of getting rid of polyadic quantification for the analysis of the data in (1).

However, an analysis along the lines of (4a) and (4b) is not always possible. It is possible only when the quantifier is negative and does not work, for example, for (1a). If we take (1a) to be a reduced form of (5a), where only the verb has been supplied, we get nonsense; only (5b), where in addition negation has been supplied, is an appropriate clausal equivalent of (1a):

(5) a. #Every man danced with every woman except John danced with Mary.

b. Every man danced with every woman except John did not dance with Mary.

Clearly, whether implicit negation is present in the gap or not cannot depend on whether the quantifier in the matrix clause is positive or negative. No standard case of Gapping patterns this way (cf. Moltmann 1992a).[30]

There are other arguments against generally eliminating polyadic quantifiers as a device of analysing exception constructions as in (1). One of them is that the same semantic phenomenon occurs, though slightly marginally, with free EPs containing conjoined NPs or PPs, as in (6):

(6) a. Except for John and Mary, no man praised any woman.

b. Except for John and Mary, every man resembles every woman.

[30] Nam (1991) analyses even ordinary Gapping in terms of polyadic quantification.

A clausal analysis of *John and Mary* in these examples is highly implausible syntactically. The only natural analysis of (6a) and (6b) is one in which *John and Mary* refers to the pair consisting of John and Mary and the EP associates with the dyadic quantifiers denoted by ⟨*no man*, *any woman*⟩ and ⟨*every man*, *every woman*⟩. Thus, for the construction in (6), polyadic quantification is needed in any case.

Another argument against generally reducing exception constructions (which might involve polyadic quantifiers) to clausal exception constructions comes from the multiple 'else'-construction, which explicitly marks the quantifiers that form the polyadic quantifer that is the EP-associate. This will be discussed in Section 2.

Since I have rejected an analysis of the exception constructions in (1) as involving true Gapping, the question arises: what is the syntactic structure of the phrases following *except*? In this paper, I have to leave this question open. The only assumption I am making is that what follows *except* in a pseudogapped EP does not have an interpretation as a proposition, but rather an interpretation as an n-tuple of entities (or better, the generalized quantifier corresponding to that n-tuple). Thus, *John with Mary* in (1) will denote the pair consisting of John and Mary (or rather the generalized quantifier corresponding to that pair).[31]

### 1.3. *Polyadic Quantifiers as the EP-associates*

Let me now turn to the general issue of polyadic quantification. Polyadic quantifiers have been the subject of extensive investigation from a logical point of view within the theory of generalized quantifiers (cf. van Benthem 1989, Keenan 1987a, 1992, Westerstahl 1992). But it has been a matter of dispute whether natural languages exhibit true instances of polyadic quantification. Among the constructions that have been regarded as cases of polyadic quantification are multiple wh-questions (cf. Higginbotham/May 1981), Bach-Peters sentences (cf. Higginbotham/May 1981), *same* and *different* in certain constructions (cf. Keenan 1987a, 1992), correlative constructions in Hindi (cf. Srivastav 1991), and adverbial or nominal quantifiers as involving unselective binding (cf. Lewis 1972, Heim 1982, Chierchia 1992). The exception constructions under discussion add a clear case of polyadic quantification in natural language to that list.

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[31] This is also the way Groenendijk and Stokhof (1984) analyse gapped answers to multiple wh-questions, as in (1):

(1) A: Who saw whom?
B: John Mary, and Sue Bill.

Let me introduce some relevant notions concerning polyadic quantifiers. In the theory of generalized quantifiers, a quantifier such as the denotation of *every man* can be considered a set of sets (the view adopted in the present paper). Such a quantifier is of type ⟨1⟩, a monadic quantifier. A quantifier of type ⟨2⟩, a dyadic quantifier, is a set of binary relations; a quantifier of type ⟨3⟩, a triadic quantifier, is a set of ternary relations, and so on.

As a general fact, any sequence of monadic quantifiers can be construed as a single polyadic quantifier. For instance, the quantifier sequence (EVERY MAN, EVERY WOMAN) can be defined as the dyadic quantifier in (7a). This dyadic quantifier can be defined in terms of monadic quantifiers as in (7b), and similarly for the quantifier (NO MAN, ANY WOMAN) in (7c):

(7)a. (EVERY MAN, EVERY WOMAN)(R) iff
$\text{MAN} \times \text{WOMAN} \subseteq \text{R}$

b. $(\text{EVERY MAN, EVERY WOMAN}) = \{\text{R} \mid \text{EVERY MAN}(\{x \mid \text{EVERY WOMAN}(\{y \mid \langle x, y\rangle \in \text{R}\})\})]$

c. $(\text{NO MAN, ANY WOMAN}) = \{\text{R} \mid \text{NO MAN}(\{x \mid \text{ANY WOMAN}(\{y \mid \langle x, y\rangle \in \text{R}\})\})\}$

The more general definition that is relevant for the present purposes is given in (8):

(8) Let $Q_1, Q_2, \ldots, Q_n$ be quantifiers of type ⟨1⟩.
$(Q_1, \ldots, Q_n)(R) \leftrightarrow Q_1(\{x_1 \mid Q_2(\{x_2 \mid \ldots Q_n(\{x_n \mid \langle x_1, \ldots, x_n\rangle \in R\})\})$ for an n-ary relation R.

Polyadic quantifiers cannot always be defined in terms of monadic quantifiers in the way given in (8). Those that can are called 'reducible polyadic quantifiers' (cf. Keenan 1987a, 1992). The EPs in (1) apply to reducible polyadic quantifiers. But they yield unreducible polyadic quantifiers. This means that the quantifier denoted by ⟨*every man*, *every woman*⟩ *except John with Mary* cannot be defined in terms of monadic quantifiers as in (7b) (cf. Moltmann, to appear a). The reason that polyadic quantification is involved in the examples in (1) is not that the initial polyadic quantifier cannot be defined in terms of monadic quantifiers as in (8), but rather the fact that what is specified as the exception under the current analysis can be an exception only with respect to a set of relations, not a set of sets, and the fact that the resulting quantifier is unreducible.

The possibility of interpreting several NPs in a sentence as a polyadic quantifier raises several questions. First of all, does such an interpretation require a noncompositional assignment of meaning to phrases that do not form a constituent? Second, under what circumstances can several NPs in a sentence be interpreted as a polyadic quantifier? I will address these questions later in Section 8. At this point, I will simply assume that any set of NPs in a minimal clause with an appropriate scope order can be evaluated as a polyadic quantifier.

## 2. Polyadic Quantification with Anaphoric Exception Constructions

There are two other exception constructions that display polyadic quantification. Both of them involve anaphoric exception expressions. The first one involves the exception expression *else*. *Else* as in (9) is a connected anaphoric exception expression (cf. Moltmann 1992a):

(9) a. John did not come. Everybody else came.
b. John came. Nobody else came.

In (9a, b), *else* anaphorically refers to 'John' in the preceding sentence and basically means 'except John'.

Keenan (1992) has observed with the example in (10a) that multiple occurrences of *else* in a sentence can lead to an interpretation not equivalent to an interpretation based on interpretations of single occurrences of *else*. This interpretation of (10a) involves polyadic quantification, as do the corresponding interpretations of (10b) and (10c):

(10) a. John praised Mary. Nobody else praised anybody else.
b. John did not praise Mary. Everybody else praised everybody else.
c. John gave Mary the book in the library, and nobody else gave anybody else anything else anywhere else.

The second sentence of (10a) has two readings. In the first reading, it can be understood as 'nobody other than John praised anybody other than Mary'. In this reading, it might describe a situation in which everybody other than John praised Mary, and John was the only one who praised somebody other than Mary. However, this is not the most plausible reading of the second sentence of (10a), given the sentence that precedes it. In the more natural reading, it means that no pair other than the pair consisting of John and Mary stands in the praising relation. This reading involves polyadic quantification. What the two occurrences of *else* in this reading do is add the pair consisting of John and Mary to the relations in the dyadic quantifier (NOBODY, ANYBODY). In (10b), the same pair is subtracted from the relations in the dyadic quantifier (EVERBODY, EVERYBODY). In (10c), the four occurrences of *else* in the relevant reading have the joint effect of subtracting the quadruple ⟨John, Mary, the book, the library⟩ from the relations in the quantifier (NOBODY, ANYBODY, ANYTHING, ANYWHERE), which is a set of four-place relations.[32]

As in the case of exception constructions with Pseudogapping, I will not say much about the compositional analysis of sentences with the multiple *else*-construction besides assuming that several occurrences of *else* may be jointly interpreted as an anaphoric EP.

There is another anaphoric exception construction besides the 'multiple *else*-construction' that may involve polyadic quantification, namely *otherwise*, which is a free exception expression. (I.e., it is restricted to adverbial syntactic position.) *Otherwise* in (11a, b) has essentially the same meaning as *else*.

(11) a. John did not come. Otherwise, everybody came.
b. John came. Otherwise, nobody came.

*Otherwise* may apply to a polyadic quantifier, but in such cases, unlike *else*, it need to occur only once in the sentence:

(12) a. John danced with Mary. Otherwise, nobody danced anybody.
b. John did not dance with Mary. Otherwise, everybody danced with everybody.

The second sentence of (12a) has two readings. On one reading, which is given in (13a), *otherwise* relates only to *nobody*. On the second reading, (12a) is equivalent to (13b):

(13) a. Nobody except John talked about anybody.
b. Nobody danced with anybody except John with Mary.

On the second reading, *otherwise* associates with the dyadic quantifier

[32] How can the multiple occurrences of *else* act together as a single EP? It is suggestive that the multiple 'else'-construction classifies together with the 'resumptive use' of quantifiers in English. This use of quantifiers, where several occurrences of a quantifier act together as a single quantifier ranging over n-tuples, was noted by May (1985, 1989) with examples such as in (1), where in (1b) each student might have asked less than many questions:

(1) a. Nobody loves nobody.
b. Many students asked many questions.

The parallel to the resumptive quantifiers is not unproblematic, though. The resumptive use of quantifiers seems to be rather marginal and for many quantifiers not available at all, whereas the multiple 'else'-construction is fully grammatical.

(NOBODY, ANYBODY). Two readings of the same sort are found for (12b).

Note that unlike pseudogapped *except*-phrases and the multiple *else*-construction, *otherwise* in the polyadic-quantification reading does not formally indicate which quantified NPs form the associated polyadic quantifier. This means that the evaluation of several quantifier occurrences in a sentence as a polyadic quantifier must be available already on the basis of the ordinary syntactic structure of the sentence. I will come back to this issue in Section 5.

## 3. The Formal Analysis of Exception Constructions with Polyadic Quantifiers

In order to generalize my semantic analysis of exception sentences with monadic quantifiers to exception sentences with polyadic quantifiers, let me first note that, as in the case of monadic quantifiers, the EP-complement in the polyadic quantification case need not specify a single n-tuple, but instead a set of n-tuples, as the exceptions, as in (14):

(14) a. Every man danced with every woman except John with Mary and Bill with Sue.

b. John danced with Mary, and Bill danced with Sue. Nobody else danced with anybody else.

c. John danced with Mary, Bill with Sue, and Tom with Claire. Otherwise, nobody danced with anybody.

The exception set that ⟨*else*, *else*⟩ in (14b) stands for is {⟨John, Mary⟩, ⟨Bill, Sue⟩}, and the one that *otherwise* in (14c) stands for in ⟨{John, Mary⟩, ⟨Bill, Sue⟩, Tom, Claire⟩}.

Furthermore, in exception constructions with a polyadic quantifiers, *except* may also take quantified complements, as in (15). The data with *else* and *otherwise* in (16) show the same point:

(15) a. Every man danced with every woman except one professor with one student.

b. Every man danced with every woman except at most two professors with at most two students.

(16) a. Two men danced with two women, and nobody else danced with anybody else.

b. At most two men danced with at most two women. Otherwise, nobody danced with anybody.

Thus, the denotation of pseudogapped EP-complements should be construed as a generalized polyadic quantifier, rather than simply an n-tuple or a set of n-tuples. The denotation of the EP-complement in (15a), for example, will be the dyadic quantifier (ONE PROFESSOR, ONE STUDENT).

The semantics of *for*-exception constructions involving polyadic quantifiers can be given as a straightforward generalization of the monadic case. In (14a) and (15a), the complements of *except* will have the denotations given in (17a) and (17b):

(17) a. [*John with Mary and Bill with Sue*] $= \{R \mid \langle \text{John}, \text{Mary}\rangle \in R\} \cap \{R \mid \langle \text{Bill}, \text{Sue}\rangle \in R\}$

b. [*one professor with one student*] $= \{R \mid [\textit{one professor}](\{x \mid [\textit{one student}](\{y \mid \langle x, y\rangle \in R\})\})$

The operation W applies to these sets of relations with the following results, where $p_1, p_2, \ldots$ are the relevant professors and $s_1, s_2, \ldots$ the relevant students:

(18) a. W([*John with Mary and Bill with Sue*]) $= \{\{\langle \text{John}, \text{Mary}\rangle, \langle \text{Bill}, \text{Sue}\rangle\}\}$

b. W([*one professor with one student*]) $= \{\{\langle p_1, s_1\rangle\}, \{\langle p_2, s_2\rangle\}, \ldots\}$

Pointwise checking of the Homogeneity Condition can now apply as well as pointwise application of the exception operation, yielding the following denotations for (14a) and (15a):

(19) a. [⟨*every man, every woman*⟩ *except John with Mary and Bill with Sue*] $= \{R \setminus \{\langle \text{John}, \text{Mary}\rangle, \langle \text{Bill}, \text{Sue}\rangle\} \mid R \in [\langle \textit{every professor}, \textit{every student}\rangle]\}$

b. [⟨*every man, every woman*⟩ *except one professor with one student*] $= \bigcup_{V' \in W([\textit{one professor with one student}])} \{R \setminus R' \mid R \in [\langle \textit{every man}, \textit{every woman}\rangle]\}$

These denotations are obtained by generalizing the semantic operation of exception constructions with monadic quantifiers to exception constructions with polyadic quantifiers as in (20):

(20) $$([except]^M([\langle NP'_1, \ldots, NP'_n\rangle]^M))([\langle NP_1, \ldots, NP_n\rangle]^M) = \begin{cases} = \bigcup_{R' \in W([\langle NP'_1,\ldots,NP'_n\rangle]^M)} \{R \setminus R' \mid R \in [\langle NP_1, \ldots, NP_n\rangle]^M\} \text{ if} \\ \text{for every appropriate extension } M' \text{ of } M \text{, for every} \\ R \in [\langle NP_1, \ldots, NP_n\rangle]^{M'} \text{, and for every} \\ R \in W([\langle NP'_1, \ldots, NP'_n\rangle]^{M'}),\ R' \subseteq R''. \\ = \bigcup_{R' \in W([\langle NP'_1,\ldots,NP'_n\rangle]^M)} \{R \cup R' \mid R \in [\langle NP_1, \ldots, NP_n\rangle]^M\} \text{ if} \\ \text{for every appropriate extension } M' \text{ of } M \text{, for every} \\ R \in [\langle NP_1, \ldots, NP_n\rangle]^{M'} \text{, and for every} \\ R \in W([\langle NP'_1, \ldots, NP'_n\rangle]^{M'}),\ R' \cap R'' = \emptyset. \\ = \text{undefined otherwise.} \end{cases}$$

How is the Quantifier Constraint satisfied by polyadic quantifiers as EP-associates? Clearly, whether or not a sequence of NPs denotes a generalized quantifier that satisfies the Quantifier Constraint is independent of whether the NPs by themselves denote universal or negative universal quantifiers. For example, the quantifier (NO MAN, EVERY WOMAN) is an iteration of monadic quantifiers which do satisfy the Quantifier Constraint, but this quantifier itself does not allow for EPs:

(21) #No man danced with every woman except John with Mary.

But the unacceptability of (21) follows from applying the Homogeneity Condition to the polyadic quantifier (NO MAN, EVERY WOMAN). In any model with some other woman besides Mary, (NO MAN, EVERY WOMAN) will contain a relation R containing ⟨John, Mary⟩ and a relation R′ not containing ⟨John, Mary⟩ (for instance, the empty relation).

## 4. Global Satisfactions and Violations of the Constraint on the EP-associate

### 4.1. *The Data*

I now turn to a new set of data which I consider further evidence that EPs apply to polyadic quantifiers. These data, basically discovered by Hoeksema (1989, 1991), involve a satisfaction of the constraint on the EP-associate not by a single NP (requiring the NP to denote a (negative) universal), but rather by the larger context in which the EP-associate occurs.

The relevant phenomena divide into two kinds. The first kind of data involve EPs that associate with indefinite NPs, which occur in the immediate scope of a negator or a negative universal quantifier. Data of the type in (22a) and (22b) were given by Hoeksema; further data are given in (22c)–(22f):

(22) a. No man danced with any woman except with Mary.
b. John did not see any woman except Mary.
c. Today no guide showed any visitor any painting except the Mona Lisa.
d. Never did any student read any book except this novel.
e. John gave a flower to Mary. Nobody else gave a flower to anybody else.
f. John once sent a postcard to Mary. But he never sent anything else to anybody else.

The second kind of data involve universal quantifiers that do not license an EP. There are two contexts in which a universal quantifier does not license an EP. In the first context, the universal quantifier is in the scope of negation:

(23) a. *Except for John, not everybody was there.
b. *Except for you, I did not meet everybody.

In the second context, the universal quantifier is in the scope of an indefinite, as was noted by Hoeksema (1991) with (24a) and (24c):

(24) a. *Except for this Cadillac, someone damaged every car.
b. Except for this Cadillac, Mary damaged every car.
c. Except for John, every professor introduced some applicant to every student.

(24a) is unacceptable, due to the occurrence of the quantifier *someone*, as the contrast with (24b) shows. In (24c), the EP can associate only with the first universal quantifier. That is, (24c) is possible only when John is the exceptional professor, not the exceptional student.

However, the restriction against free EPs associating with a universal quantifier in the scope of an indefinite does not hold for all positions in which the EP may occur. Furthermore, it does not hold for connected EPs. Thus, the following examples are all acceptable in the relevant interpretation:

(25) a. Somebody damaged every car except for this Cadillac.
b. Every professor introduced some applicant to every student except for John.

(26) a. Somebody damaged every car but/except this Cadillac.

b. Every professor introduced some applicant to every student but John/except John.

Without going into further details, the data given in this section indicate that the constraint underlying the Quantifier Constraint is not generally a local condition on the NP associated with the EP, but rather a constraint that may be satisfied only by the larger context in which that EP occurs. But how the constraint is satisfied depends on whether the EP is free or connected and where it occurs in the sentence. In the next section, I will show that the data do not require abandoning the semantics of EPs that I have given (in particular the Homogeneity Condition), but rather can be handled within that very same account, namely in terms of polyadic quantification.[33]

### 4.2. *An Explanation in Terms of Polyadic Quantification*

My explanation of the data in (22), (23) and (24) is as follows: here the quantifier the EP applies to is actually not the quantifier denoted by the associated NP, but rather a polyadic quantifier formed also from other quantifiers and operators in the sentence (even though the terms in the EP-complement may not correspond to the adicity of the quantifier). For example in (22a), the EP *except Mary* seems to specify only a single

[33] The data lead Hoeksema to take the semantic constraint underlying the Quantifier Constraint as a global semantic constraint as follows: an exception sentence must be closed under subdomains (or submodels) and under unions of domains (or union of models):

(1) If S is a sentence containing an EP, then (i) and (ii):
(i) *Closure under subdomains*
If $X' \subseteq X$ and $[S]_X = \text{true}$, then $[S]_{X'} = \text{true}$.
(ii) *Closure under union of domains*
If $[S]_X = \text{true}$ and $[S]_{X'} = \text{true}$, then $[S]_{X \cup X'} = \text{true}$.

In the case of indefinite NPs in the scope of negation, it is obvious that closure under union of domains and under subdomains hold. Also (1) accounts for the case of EPs associating with universal quantifiers in the scope of an indefinite, as in (24a) and (24c) in the text. In this case, (1i) and (1ii) are not generally satisfied. (1i) does not obtain when the entities that would satisfy the indefinite NP are themselves taken away from the domain. (1ii) is not satisfied when only distinct entities in the two domains satisfy the indefinite NP.

(1), however, is problematic for exception sentences which contain an existential or downward-entailing quantifier in the scope of the EP-associate such as:

(2) Except for Bill, every student solved exactly one/some/less than ten problems.

If the domain changes with respect to the number of problems, then, clearly, (2) need not be true anymore. Thus, (1) can be satisfied only under additional assumptions concerning the domains relative to the interpretation of other NPs in the sentence.

Besides this empirical problem, there does not seem to be any independent motivation for why (1) should hold at all.

individual as the exception, but nonetheless, on my account, it applies to a polyadic quantifier, namely the dyadic quantifier (NO MAN, ANY WOMAN). This quantifier is a negative universal quantifier and hence satisfies the Quantifier Constraint.

This account of the data is not unmotivated, since, as we have seen, several NPs in an exception sentence may denote a polyadic quantifier anyway. The case of *otherwise*, moreover, showed that the formation of a polyadic quantifier is possible independently of whether the exception construction formally marks which quantified NPs contribute to the formation of that quantifier. Thus, the fact that, in (22a), the EP contains the correlate (i.e. *Mary*) of only one of the participating quantified NPs (i.e. *any woman*) should not prevent *no man* and *any woman* from forming a dyadic quantifier.

This account has to answer one crucial question, namely how can the EP *except Mary* appropriately apply to a dyadic quantifier? Let us look at what the EP in (22a) actually does. It specifies that there is one or more pairs ⟨x, Mary⟩, where x is a man so that x did not dance with Mary. Thus, the EP-complement should in some way stand for the quantifier (SOME MAN, MARY) so that the meaning of (22a) will be (28):

(28) (([*except*](SOME MAN, MARY))(NO MAN, ANY WOMAN))([*saw*]))

How could the EP-complement *Mary* stand for this quantifier? A first possibility is that *Mary* has an alternative denotation as a polyadic quantifier (via some variety of type-shifting), let us say $\{R \mid \exists x(\text{MARY}(\{y \mid \langle x, y\rangle \in R\}))\}$. However, if *Mary* has this denotation, then the relations R in this set do not necessarily contain a pair consisting of a **man** and Mary, and to restrict the existential quantifier to men would clearly go against compositionality.

I suggest an alternative account on which it is not the denotation of the EP-complement that is modified, but rather the exception operation. On this account, the exception operation will be a two-place operation. I restrict myself to formulating it only for the case of (22a) as in (29):

(29) $$[\textit{except}]([\textit{Mary}], (\text{NO MAN, ANY WOMAN})) = \bigcup_{R' \in \{X' \text{x} \{\text{Mary}\} \mid \exists X(X' \subseteq X \;\&\; X \in W(\text{NO MAN}))\}} \{R \setminus R' \mid R \in (\text{NO MAN, ANY WOMAN})\}$$

In (29), *except* applies to a pair consisting of the entity Mary and a dyadic quantifier Q that is the iteration of the monadic quantifiers NO MAN and NO WOMAN and maps it to the dyadic quantifier Q′ obtained from taking away from every relation R in Q the Cartesian product of a subset of the witness set of NO MAN (i.e. a set consisting of at least one man) and the set {Mary}.

The polyadic quantification account also handles the rest of the data in (22). For example, in (22d), the Quantifier Constraint is satisfied with respect to the quantifier (NEVER, ANY STUDENT, ANY BOOK), and the quantifier implicitly specified by the EP is (SOMETIMES, SOME STUDENT, THIS NOVEL).

How does the polyadic quantification account apply to the cases where the quantifier with which the EP associates lies in the scope of a sentence negation, as in (22b)? It is natural to assume that whatever operation is responsible for the formation of polyadic quantifiers may also involve other operators such as negation. In fact, negation can be conceived of as a predicate holding of 0-place relations. Applying the scheme in (8) yields the following quantifier:

(30) $[\langle \textit{not, any woman} \rangle] = \{V \mid \neg \text{ANY WOMAN}(V)\}$

The polyadic quantification account also explains the global violations of the constraint on the EP-associate in the examples in (23), once one additional assumption is made (which I will come to below): in (23a) and (23b), (8) obligatorily applies to the negator and the quantified NP as a single quantifier. Thus, in (23a) and (23b), the associated quantifier will be ¬EVERYBODY, which violates the Homogeneity Condition.

(24a) and (24c) are accounted for in a similar way. The unacceptability of (24a) follows if *except for this cadillac* obligatorily associates with the dyadic quantifier (SOMEBODY, EVERY CAR), which violates the Homogeneity Condition. The unacceptability of (24c) follows under the assumption that *except for John* obligatorily associates with the triadic quantifier (EVERY PROFESSOR, SOME APPLICANT, EVERY STUDENT), which does not satisfy the Homogeneity Condition.

Why do the EPs in (23) and (24) obligatorily apply to those quantifiers, rather than simply the universally quantified NPs? Without going into a more thorough investigation, I suggest that whenever a free EP is in clause-initial position, it must associate with the polyadic quantifier formed by all the operators or quantified NPs in the clause, more precisely, all those operators or quantified NPs that the EP c-commands:

(31) *Condition on the association of* for-EPs *with polyadic quantifiers*
A free EP Y must associate with the polyadic quantifier denoted by the maximal sequence of phases $\langle XP_1, \ldots, XP_n \rangle$ such that Y c-commands $XP_1, \ldots,$ and $XP_n$.

The data discussed in this section have a more general implication concerning the formation of polyadic quantifiers in natural language. They imply that not all quantified NPs in a clause are obligatorily interpreted as polyadic quantifiers, as was suggested by May (1989). Rather than applying to the polyadic quantifier denoted by the maximal set of NPs in a clause, an EP, in an appropriate position, allows for a local satisfaction of the constraint on the EP-associate.

## 5. The Syntactic Basis for the Formation of Polyadic Quantifiers in Natural Language

EPs with polyadic quantifiers raise an important question, namely how is it possible that two or more quantified NPs (possibly together with sentence negation) may together denote a polyadic quantifier without violating compositionality? In this section, I will give a speculative answer to this question.

Let me recall relevant cases of EPs applying to a polyadic quantifier:

(32) a. Every man danced with every woman except John with Mary.
b. (?)Every man danced with no woman except John with Mary.
c. Every student always solved every problem except John yesterday the last one.
d. John did not dance with any woman except Mary.
e. (?)Every man did not dance with any woman except Mary.

Let us first consider (32a). *Every man* and *every woman* do not form a constituent. The question therefore is: how can these NPs together be evaluated as a single polyadic quantifier? An answer might be found within an approach to the syntactic basis of semantic interpretation based on Quantifier Raising (QR) at the level of Logical Form (LF). In such an approach, quantified NPs such as *every man* and *every woman* in (32a) may (by QR) adjoin to the same syntactic node and thus become 'sufficiently close' to be evaluated as a single polyadic quantifier. This has been proposed by Higginbotham/May (1981) and, in somewhat different ways, by May (1989). In the account of Higginbotham/May (1981), polyadic quantification is the semantic correlate of a syntactic operation of what they call 'Quantifier Absorption', an operation that takes place at the level of LF. This operation, given in (33) applies optionally to a sequence of two or more quantified NPs which, having undergone QR, are adjacent to each other at LF:

(33) $[Q_1x: N'(x)][Q_2y: N''(y)] \rightarrow [Q_1x, Q_2y: N'(x) \ \& \ N''(y)]$

In this approach, the LF representation of (32a) is as in (34a) and its 'logical form' as in (34b):

(34) a. Every man [every woman [$_S$ e danced with e′ except John with Mary]].

b. [every x, every y: man(x) & woman(y)] [except John with Mary] x danced with y.

How does the LF account fare as a general solution to the compositionality problem for polyadic quantifier formation? Clearly, the LF account works well for the case in (32a), but it is more problematic for the other examples in (32). Concerning (32b), there is less evidence that negative quantifiers undergo QR, since they generally cannot take scope over the subject (cf. Beghelli 1992). It is similarly a matter of controversy whether quantified adverbs such as *always* in (32c) undergo QR, since they generally take scope *in situ* (cf. Ladusaw 1988). Finally, it is generally not assumed that sentence negation as in (32d) and (32e) undergoes QR. Now in the case of (32d), one might argue that *any woman*, being a negative polarity item, has a sufficiently strong syntactic connection to the negator *not* to be interpreted as a negative quantifier together with *not*. But such an assumption would not be of much help in the case of (32e), where *every man* should be interpreted as a binary quantifier together with *not* and *any woman*. Thus, it appears that unless QR is extended to negation and adverbs in rather problematic ways, the compositionality problem for polyadic quantifier formation cannot generally be solved at LF.

I suggest an alternative solution to the compositionality problem. As I argued in Part I, EPs may apply at a level of implications of what the sentence without the EP means. Given this general fact, the interpretation of exception sentences with polyadic quantifiers can be seen in a new light. Such sentences are first interpreted without the EP in the usual way, namely as a proposition p involving ordinary monadic quantifiers as the denotations of individual NPs. Then the level of implications comes into play, where p will be reformulated as an equivalent proposition p′, which involves the appropriate polyadic quantifiers. To illustrate this, (32a) first will be interpreted without the EP as (35a), which will then be reformulated as (35b) with a dyadic quantifier:

(35) a. EVERY(MAN)({x | EVERY WOMAN({y | [*danced with*](*x*, *y*)})})

b. (EVERY MAN, EVERY WOMAN)({⟨x, y⟩ | [*danced with*](x, y)})

(35b) provides the appropriate polyadic quantifier for the EP *except John with Mary*. Analysing the proposition in (35b) into its constituents, i.e. the binary quantifier and the predicate, allows the EP to apply to that quantifier, and the resulting quantifier will apply to the predicate, yielding (([*except*]([*John with Mary*]))(EVERY MAN, EVERY WOMAN)) ([*danced with*]) as the full meaning of (32a).

Clearly this procedure would work for all cases in (32). But, this solution to the compositionality problem (unless it is subject to further constraints) may have scary consequences. For what would happen if generally an expression E in a sentence S could be evaluated only at the level of implications, that is, by first evaluating S without E, then reformulating the resulting meaning p until one gets an appropriate semantic constituent o in p for E to apply to, then taking p apart so that one gets o in isolation, then applying the denotation of E to o, then again putting the result together with the other 'parts' of p, in order to get the full meaning of S?[34,35]

## 6. Further Constructions of Exception Phrases Associating with Polyadic Quantifiers

### 6.1. *'Donkey'-sentences*

So far I have discussed exception constructions where the associated polyadic quantifier is denoted by a sequence of ordinary NPs in a sentence. As was mentioned in Section 3, there are a number of constructions for which a polyadic quantification analysis is plausible or has in fact been advocated in the literature. One of them are 'donkey'-sentences such as (36a), which have been argued to involve unselective binding. This is indicated in (36b), where a quantifier unselectively binds free variables that are represented by indefinite NPs (cf. Lewis 1973, Heim 1982, Chierchia 1992):

[34] There is at least one analysis in the semantic literature which is of that type, namely Groenendijk/Stokhof (1992)'s analysis of adverbs of quantification in interrogative contexts.

[35] Another question about polyadic quantifier formation is: does the linear sequence of quantifiers matter, or may quantifiers form a polyadic quantifier with a different scope order than their linear order? It appears that the latter is the case. This is seen with the EP *otherwise* in (1), which may associate with the polyadic quantifier (NO, MORE THAN THREE):

(1) John wrote four letters to Mary. Otherwise, John wrote more than three letters to no woman.

Thus, the formation of polyadic quantifiers in the relevant sense may reverse linear order and so is not based on the temporal order of information.

(36) a. Every farmer who owns a donkey beats it.
b. [Every x, y: farmer(x) & donkey(y)] beat(x, y)

If *every* unselectively binds the free variables represented by *a donkey*, (36a) will be equivalent to a statement with universal quantification over pairs of farmers and donkeys. Hence we expect that EPs apply to such unselective quantifiers. This prediction is borne out by examples such as (37):

(37) Every man who came with a woman danced with her except John with Mary.

A theoretically interesting question then arises, namely do examples such as (37) support the view that 'donkey'-sentences involve unselective binding, rather than an existential quantifier, as in an E-type analysis (as recently argued for by Heim 1990) or in Dynamic Predicate Logic (Groenendijk/Stokhof 1990)? Not necessarily. The basis for the application of the EP in (37) may be the level of implications, where *every man* and *a woman* form a dyadic quantifier, regardless of how *a woman* itself is interpreted.

Note that in 'donkey'-sentences with conditionals, EPs are much less acceptable:

(38) ??If a student studied with a famous professor, he always learned from him except John from Professor X.

This can be attributed to the fact that generic indefinite NPs generally resist EPs:

(39) ??A dog barks except Fido.

The explanation for this general fact, presumably, is that generic quantifiers do allow for exceptions and hence would not satisfy the Homogeneity Condition. This is supported by the behavior of NPs with 'free choice *any*'. Such NPs, given the analysis of Kadmon/Landman (1993), are indefinite generic NPs, but with an extended domain so that they may disallow exceptions. In fact, NPs with *any* do allow for EPs:[36]

(40) Any dog barks except Fido.

[36] Note that it is a problem for Kadmon/Landman's (1993) approach why *almost* is possible with free choice *any*, but not with negative polarity *any*:

(1) #Nobody danced with almost any woman.

In my terms, the question would be why *almost* can associate with a polyadic quantifier formed by an NP with free choice *any* and the generic operator, but not with the polyadic

### 6.2. *Multiple wh-interrogatives*

Another construction that has been argued to involve polyadic quantification are wh-interrogatives with multiple wh-phrases, as in (41a) in the reading represented in (41b) (cf. Higginbotham/May 1981):

(41) a. Which man danced with which woman?
b. For which x, which y [man(x), woman(y)], x danced with y

As predicted, these wh-constructions allow for EPs with as many terms as there are wh-phrases:

(42) Except for John and Mary, Bill knows which man danced with whom.

Interestingly, also pair-list reading sentences with a non-wh quantified NP allow for EPs with several terms:

(43) Except for John and Mary, Bill knows with whom every man danced.

Given that EPs may operate at the level of implications, again, the possibility of drawing any theoretical consequences from (42) and (43) is blurred. At the level of implications, one may get the appropriate universal dyadic quantifiers for (42) and (43) in whatever way embedded interrogatives with multiple wh-phrases and other quantifiers are analysed. The possibility of EPs does not necessarily decide between an analysis which assigns (43) exactly the same meaning as (42) (cf. Groenendijk/Stokhof (1984)), one which allows quantifying into questions (cf. Higginbotham 1992), or one which reduces (43) to a functional reading of wh-phrases (cf. Chierchia 1993). These analyses all assign a meaning to (43) that implies the proposition (44), which contains an appropriate dyadic quantifier for the EP to apply to:

(44) $(([except](\langle John, Mary\rangle))(\{R \mid EVERY\ PERSON(\{x \mid EVERY\ MAN(\{y \mid R(x, y)\})\})\})(\{\langle x, y\rangle \mid \text{Bill knows whether x danced with y}\})$

To summarize this part of the paper, we have seen that EPs may apply to polyadic quantifiers; and the explanation why this is possible, in all cases, may be that EPs operate at a level of implications at which the polyadic quantifier is formed.

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quantifier formed by a negative quantifier and an NP with negative polarity *any*. I do not have an answer to that question.

## 7. Summary

In this paper, I have proposed a compositional semantic analysis of exception NPs from which three core properties of exception constructions could be derived. I have shown that this analysis overcomes various empirical and conceptual shortcomings of prior proposals of the semantics of exception sentences. The analysis was first formulated for simple exception NPs, where the EP-complement was considered a set-denoting term and the EP-associate was a monadic quantifier. It was then generalized in two steps: first, in order to account for quantified EP-complements, and second, in order to account for polyadic quantifiers as the EP-associates. An additional assumption that was made in several places was that EPs may operate at the level of implications. The consequences of this assumption, though, still have to be investigated.

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