The Role of Microvariation in the Study of Semantic Universals: Adverbial Quantifiers in European and Québec French

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Abstract

This paper addresses the question of semantic universals with a particular focus on the limits of cross-linguistic variation in the semantics of lexical expressions. I argue that the variation observed in the semantics of adverbial quantifiers in the *Quantification at a distance* construction (ex. *J'ai beaucoup lu de livres*) between Standard European French (SF) and Québec French (QF) constitutes an important argument for the existence of polyadicity as a lexical property in natural language. Specifically, I propose that QAD sentences in the European dialect involve an unreducible binary quantifier over <event, object> pairs, and that the same construction in the Canadian dialect involves a unary quantifier over individuals. I argue that the construction has the same syntax in both dialects, and, therefore, the variation in the type of quantification should be attributed to variation in the lexical semantics of the adverbial quantifiers of the language.

1 Introduction

This paper addresses the question of semantic universals with a particular focus on the limits of cross-linguistic variation in the semantics of lexical expressions of natural language. I argue that the field of *semantic microvariation*, that is, the study of variation in the semantic component of the grammar between closely related dialects, has an important contribution to make to the proper characterization of the class of functions denotable by the quantificational expressions of human languages. In this paper, I provide a concrete example of the contribution of formal dialectology to linguistic theory: I argue that the variation observed in the semantics of adverbial quantifiers between Standard European French (SF) and Québec French (QF) constitutes an important argument for the existence of polyadicity as a lexical property in natural language.

In the framework of interpretative semantics (for example, much of the work that has derived from Montague (1974)), the meaning of complex expressions is not only a function of the meaning of their atomic parts (their lexical items), but also a function of the way in which these elements are combined together. Thus, in a case where a particular proposition is expressed through very different syntactic structures in unrelated languages, it is extremely difficult, if not impossible, to identify at what point the variation that we are looking at derives from a semantic difference between the structure's components or from the way in which those components are combined together. The problem of syntactic variation for the field of comparative semantics has been discussed before, for example, by Longobardi (2002), who argues that it can be circumvented by comparing the interpretation of structures in domains in which the syntax remains fairly constant. He says (p.336),

> The optimal case in point to investigate such problems should be provided, in principle, by instances of *syntactic homophony* across languages; by this term let me understand cases in which what appears as roughly the same surface syntactic shape clearly corresponds to distinct logical representations in different languages.

The main focus of Longobardi's paper is variation in the overt expression of the determiner between the Romance and the Germanic languages, and, indeed, the syntactic variation in the nominal domain between these families is relatively minor, so it lends itself well to comparative semantics[1]. However, I propose that there are cases in natural language that meet the *syntactic homophony* criterium even better. In particular, I suggest that looking at variation in the interpretation of strings of mutually intelligible, related dialects allows us to start from the assumption that, in most respects, the syntax of these languages is very similar, if not identical. We can therefore identify subtle differences in the interpretation of identical syntactic structures that we can reliably attribute to the semantics of their atomic expressions.

The main semantic universal discussed in this paper concerns the constraints on the functions that are denotable by quantificational expressions in

[1]Another approach that focuses on the mapping from syntax into semantics in the determiner domain is Chierchia (1998)

natural language. In particular, I argue that the comparison of the interpretations assigned to sentences with certain adverbial quantifiers in Standard French and Québec French serves as an important argument that atomic expressions of natural language can denote not only unary but also properly binary generalized quantifiers (pair quantifiers). Although the existence of properly polyadic quantification in natural language has been proposed before in the literature, notably by van Benthem (1989) and Keenan (1992), it has not yet been established that polyadicity can be a property of lexical items rather than complex syntactic structures. In fact, it would seem that a majority of the naturally occurring examples of binary quantification that have been proposed involve syntactic reduplication. Some examples of such structures are shown below.

(1) a. **No** man loves **no** woman
(van Benthem (1989); May (1985))
b. **Different** students answered **different** questions on the exam
(Keenan (1992))
c. John didn't praise Mary, but **everyone else** praised **everyone else**.
(Moltmann (1992))
d. **Which** dog chased **which** cat?
(Keenan (1992))
e. **Personne** (n')aime **personne**
no one (neg)loves **no one**
'No one likes anyone'
(French negative concord (de Swart and Sag (2002)))[2]

Given that the main cases of polyadic quantification presented in the literature involve doubling or other syntactic processes, we might wonder whether the ability to bind multiple variables is a property exclusively of syntactic rules, not of individual words. Thus, universally, the atoms of linguistic expressions could be semantically simple, but a more complicated meaning could arise through rules for interpreting complex structures. An example of such a theory is found in de Swart and Sag (2002)'s analysis of French negative concord structures. In their analysis, individual negative expressions denote unary quantifiers, and polyadic quantifiers are created out of them by a phrasal semantic resumption rule.

I argue that a syntactic approach to polyadic quantification is not sufficient to account for (at least) some phenonema in natural language. I present a case where, in two dialects of the same language, the same quantificational

[2] Also Iordachioaia (2010) for a polyadic approach to Romanian negative concord

expression is interpreted differently: in one dialect, it is interpreted as involving a properly binary quantifier, and, in the other, it is interpreted as involving a simple unary generalized quantifier. Additionally, I argue that the constructions in which the semantic variation is observed have the same syntactic structure in both dialects. I therefore conclude that the dialectal difference observed should be located in the lexical semantics of the quantificational adverbs involved, not in the syntax of the expressions that they appear in.

The quantifiers that display such dialectal variability are those that are known in the literature (cf. Doetjes (2007)) as *degree* adverbs. This class contains, among other, the elements *beaucoup* 'a lot', *peu* 'little', *tellement...que* 'so much...that', *trop...pour* 'too...for', *assez...pour* 'enough for', *plus...que* 'more...than', *moins...que* 'less...than', and *pas mal* 'fairly'. However, as is common in the literature, I will most often exemplify this class by use of the quantifier *beaucoup* 'a lot'.

Syntactically, the adverb *beaucoup* appears in the left periphery of the VP.

(2) a. J'ai **beaucoup** dormi
I have a lot slept
'I slept a lot'

b. J'ai **beaucoup** lu *La guerre et la paix*'
I have a lot read the war and the peace
'I read 'War and Peace' a lot'

Examples such as (2) are instances of simple adverbial (event) quantification. In both dialects, these sentences are true just in case the set of events described by the main predicate-in (2-a), events of sleeping-has many members.

Beaucoup also has a use as a nominal quantifier, in which case it appears in the left periphery of the DP and selects for a phrase headed by the determiner *de*.

(3) J'ai lu **beaucoup de livres**
I have read **a lot de books**
Roughly: *'I read a lot of books'*

In both Standard French and Québec French, *beaucoup* ranges over the individuals denoted by the direct object, and (3) is true just in case the set of books that I read contains many members. However, we observe a dialectal difference in the interpretation of sentences containing *beaucoup* when the adverb appears with a VP whose direct object is headed by *de*. These sentences are known as *Quantification at a Distance* (QAD) sentences in the literature.

(4)	J'ai	**beaucoup**	lu	**de livres**	
	I have	**a lot**	read	**de books**	
	'I read a lot of books'				**Quantification at a Distance**

This construction has recieved a great deal of attention in the syntactic and semantic literature, being featured in works such as Kayne (1975), Milner (1978), Obenauer (1978), Obenauer (1983), Obenauer (1994), Rizzi (1990), Doetjes (1997), Dekydtspotter et al. (2000), and Mathieu (2002), among others. This paper presents novel semantic analyses of the QAD construction in both European and Québec French, and a discussion of the significance of this dialectal variation for our current vision of lexical semantics.

The paper is organized as follows: In section 2, I present some background on the properties of unary and binary quantification, and their realization in natural language. In section 3, I briefly argue that QAD sentences have the same syntax in both dialects. In particular, I show that both SF QAD and QF QAD are subject to the same syntactic locality constraints. In section 4, I present the data on the semantics of QAD sentences in Standard French. I argue for a semantic analysis in which *beaucoup* is a quantifier over <event, object> pairs, and give a proof that this quantifier is unreducible. In section 5, I present the data on the semantics of QAD sentences in Québec French. I consider a pair-quantification analysis for QF QAD, but then prove that such a quantifier would be reducible to iterations of simple unary quantifiers. I provide further arguments for a unary analysis of *beaucoup* in Québec French.

Since the construction does not differ in its syntax between dialects, I conclude that the locus of variation is in the lexical item *beaucoup.* I conclude, by extension, that lexical items in natural language can denote properly polyadic functions.

2 Generalized Quantifier Theory

In this section, I present a brief introduction to both monadic and polyadic quantification in *Generalized Quantifier* theory.

2.1 Unary Quantification

In classic *Generalized Quantifier* theory (Barwise and Cooper (1981); Keenan and Stavi (1986)), subject DPs in French (and in other languages) denote unary generalized quantifiers: functions from properties[3] to truth values. In the literature, these functions are known as type $< 1 >$ quantifiers. For

[3] subsets of the domain E.

example, a DP like *trois enfants* ‘three children’ in subject position denotes the function $3C^1$.

(5) For all $P \in \mathcal{P}(\mathrm{E})$, $3C^1(P) = 1$ iff $\mid CHILD \cap P \mid = 3$

Thus, in a sentence like *Trois enfants dansent* ‘Three children dance’, the GQ *trois enfants* maps the property *danser* to true just in case the cardinality of the intersection of the set of children and the set of dancers is three.

(6) $[\![$ Trois enfants dansent $]\!] = 1$ iff $\mid CHILD \cap DANCE \mid = 3$

In direct object position, GQs are functions from transitive verb denotations (binary relations) to properties. In this way, when it appears in direct object position, *trois enfants* denotes the following function $3C^2$.[4]

(7) For all $R \in \mathcal{P}(E \times E)$, $3C^2(R) = \{a : 3C^1(aR) = 1\}$

In a sentence like *Tous les profs ont vu trois enfants* ‘All the professors saw three children’, *trois enfants* combines with *voir* ‘to see’ to give the set of objects that saw three children. The subject GQ *Tous les profs* ‘All the teachers’ then maps this property to true just in case the set of teachers is a subset of the set of objects that saw three children.

(8) $[\![$ Tous les profs ont vu trois enfants $]\!] = ((\forall(\mathrm{TEACHER}))(3\mathrm{C}^2(\mathrm{SEE}))$

As pointed out by Keenan (1987a), the behaviour of quantifiers in argument position is completely predictable; therefore, there is no need to assign them different semantic types depending on their syntactic position. Following Keenan, I assume that DPs denote *arity reducing functions* (functions from $n+1$-ary relations to n-ary relations). These functions are straightforwardly extended from type $< 1 >$ GQs in the following way:

(9) Where F^1 is a generalized unary quantifier (over E) we extend the domain of F to include all $n+1$ ary relations R by setting
$F^{n+1}(R) = \{< a_1, ..., a_n >: F^1(\{b :< a_1, ..., a_n, b >\in R\}) = 1\}$

In summary, the vast majority of DPs and other quantificational elements in French denote *unary generalized quantifiers*, that is, functions from $n+1$-ary relations to n-ary relations. They combine with the relation denoted by the verbal predicate, and they reduce its arity by one.

[4] As a notation convention, I write aR for the set of elements that are related to a by R.

(i) $aR =_{def} \{b : \langle a, b\rangle \in R\}$

2.2 Binary Quantification

In this section, I review some examples where quantificational elements in natural language have been argued to denote functions that reduce the arity of a predicate by more than one. Quantifiers that do so are called *polyadic* quantifiers, and those that directly take binary relations to truth values are called *binary* (type $< 2 >$) quantifiers.

Within the extension of Generalized Quantifier theory to relations of arity greater than one, sentences involving two quantificational DPs, like the example *Tous les profs ont vu trois enfants* 'All the teachers saw three students' above, can be analyzed as involving a type $< 2 >$ GQ, one that expresses a property of a binary relation, in this case SEE. Of course there is no need to propose that *Tous les profs ont vu trois enfants* involves a binary quantifier since such a quantifier is straightforwardly reducible to the iteration (i.e. composition) of two unary quantifiers: as shown in (8), first *trois enfants* is applied to *SEE*, and then *tous les profs* is applied to the result. Indeed, given that *trois enfants* and *tous les profs* are distinct syntactic objects, a unary analysis of these objects is preferable. Binary quantifiers that are equivalent to the iterated application of unary quantifiers are known as *Fregean* (or *reducible*) in the literature.

However, it has been observed for a long time that quantification within the domain of individuals in natural language goes beyond the Frege boundary, i.e. must be analyzed in terms of unreducible polyadic operators (van Benthem (1989); Keenan (1987b); Keenan (1992)). For example, Keenan (1992) argues that the *different-different* construction (10) must be analyzed in terms of a binary quantifier, which he then proves to be unreducible.

(10) Different students like different things

The main observable property that characterizes unreducible binary quantification from reducible quantification is scopal independence. Iterated unary quantification builds in a scope dependency between the two quantifiers involved. With properly binary quantification, there is no such dependency. To see this more clearly, consider the following example: In (11) and (12) are two quantifiers, one unary and one binary, that both roughly mean 'five things'.

(11) For all $R \in \mathcal{P}(E_1 \times ... \times E_{n+1})$, $5^1(R) = \{< a_1, ..., a_n >: \mid \{b :< a_1, ..., a_n, b >\in R\} \mid= 5\}$

(12) For all $R \in \mathcal{P}(E \times E)$, $5^2(R) = 1$ iff $\mid Dom(R) \mid = 5$ and $\mid Ran(R) \mid = 5$

We can form a binary quantifier by iterating 5^1 with itself, i.e. composing two occurrences of the function in (11): $5^1 \circ 5^1$. This process builds in a scope dependency between the two 5^1s: this reducible binary quantifier is only true of a relation R if five elements in its domain are related to five elements in its range (each). The unreducible quantifier 5^2 in (12) is true of a relation if there are five elements in its domain and five in its range, regardless of how these elements are related to each other.

In the next section, I argue that we observe properties similar to those of (12) with the quantification involved in the QAD construction in Standard European French. In the section after that, I argue that the interpretations assigned to QAD sentences in Québec French are best modeled by a quantifier like (11). However, I first provide a brief overview of the syntactic properties of the construction and argue that they are identical in both dialects.

3 The Syntax of QAD

Following previous work on the construction[5], I show that QAD sentences obey all the same syntactic locality restrictions in Québec French as they do in Standard French. Since there are no structures upon which judgments of syntactic grammaticality differ between dialects, I conclude that QAD sentences in Québec French have the same syntax as their counterparts in the standard dialect.

The formation of a QAD sentence (a sentence with a degree adverb and a *de* phrase complement) is very restricted in both varieties of French. For example, quantification 'at a distance' is impossible over the subject position in both FS and FQ.

(13) *D'enfants ont beaucoup lu trois livres
de children were a lot read three books
Intended: 'A lot of children read three books'

This is also true in both dialects for derived subjects like passives (14) and unaccusatives (15).

(14) *De livres ont été beaucoup lus
de books have been a lot read
Intended: 'A lot of books were read'

(15) *D'enfants sont beaucoup arrivés
de children were a lot arrived
Intended: 'A lot of children arrived'

[5]The majority of the points presented in this section come from Milner (1978), Kayne (1975), Obenauer (1983), and Valois (1991)

Furthermore, as shown by Valois (1991) (summarizing observations from Muller (1977) and Kayne (1981)), QAD is impossible across PPs, inverted constituents, and definite DPs.

(16) a. *J'ai beaucoup parlé à de filles
I have a lot talked to of girls
(cf. *J'ai parlé à beaucoup de filles*)

b. *J'ai beaucoup dormi pour guérir de petits maux
I have a lot slept to heal of little hurts
(cf. *J'ai dormi pour guérir beaucoup de petits maux*)

c. *J'ai beaucoup considéré intelligents d'étudiants
I have a lot considered intelligent of students
(cf. *J'ai considéré intelligents beaucoup d'étudiants*)

d. *J'ai beaucoup regardé la photo (de) d'enfants
I have a lot looked at the photo (of) of children
(cf. *J'ai regardé la photo de beaucoup d'enfants*)

(Valois (1991: 139))

Finally, QAD is impossible across tensed clause boundaries in both dialects of French.

(17) *J'ai beaucoup pensé que Jean a lu de livres
I have a lot thought that Jean has read of books
Intended: 'I thought that Jean read a lot of books'

In summary, the QAD construction has a very restricted syntactic distribution, and the pattern found in Standard French is replicated exactly in Québec French. Given how specific the syntactic constraints on the construction are, the fact that they hold without exception in both dialects suggests that QAD sentences have the same syntax in both SF and QF. In the rest of the paper, I examine variation in the interpretations assigned to QAD sentences. Given the results of this section, we can conclude that if we see variation in the interpretation of these sentences, we are seeing variation in the semantics of the lexical items in the dialect, not in the syntax of the construction.

4 Quantification at a Distance in Standard French

In this section, I present data and a semantic analysis of the *Quantification at a Distance* construction in the 'Standard' dialect of European French[6]. I

[6]It must be noted that, in this article, I use the term *Standard European French* to refer not to a dialect that is geographically based, but rather to the/a dialect of French

argue that, in this dialect, the eventive adverb *beaucoup* has a binary extension to <event, object> pairs. I argue that such an analysis is necessary since such an extension is unreducible to the composition of unary quantifiers. The proof of this fact is given in Appendix 1. I then provide a compositional analysis of QAD that shows how the meaning of the construction is straightforwardly built up from the meaning of its parts.

4.1 Data

In this section, I present data on the interpretations of QAD sentences with *beaucoup* in the Standard dialect of European French. I show that quantification done by the adverbial quantifier in this dialect is, at the same time, quantification over the event variable of the verb, and the variable supplied by the direct object.

4.1.1 Event Quantification

At fist glance, QAD sentences seem synonymous with their canonical counterparts; however, upon closer inspection, we see that the quantification in QAD actually involves quantification over the event argument of the verb. As first noticed by Obenauer (1983), QAD sentences can be used in only a subset of the contexts in which canonical quantification sentences are used. In particular, QAD sentences in Standard French are only true if *beaucoup* holds of the set of events denoted by the verb. This generalization is known in the literature as Obenauer's *Multiplicity of Events* requirement.

(18) ***Multiplicity of Events Requirement:*** *(MER)*
QAD sentences are only true in contexts involving many events

that displays the semantic pattern that will be described below. I call this the *Standard European* pattern, since it is the pattern that has been observed and analyzed in previous works on QAD, all of which were carried out on a European dialect. However, it has been brought to my attention that the judgments reported in section 4 are not shared by all European French speakers; for some, the pattern described in section 5 is a more accurate description of their dialect. In particular, some speakers report having the feeling that the difference, for them, is a more of a register difference. Additionally, in an informal survey that I conducted on QAD in Montréal French, I found that almost as many participants displayed the pattern described in this section as the one that will be described in the section on Québec French. Additionally, in a very limited study of Franco-Ontarien from the Ottawa area, I found that these speakers had the Québec pattern. For the purposes of this paper, I will simply analyze the two patterns independently, leaving the study of the geographical and social determinants of the semantic variation examined in this paper for further study.

In what follows, I present three tests for the presence of the MER in QAD sentences, the majority of which are drawn from the works of Obenauer. Following Obenauer, I argue that the presence of the MER indicates that, in QAD sentences, the quantifier *beaucoup* is a VP adverb that quantifies over the verb.

The first way of testing for adverbial quantification is through the use of point adverbials. We can insert a prepositional phrase, like *dans cette cassette* 'in this box' or *en soulevant le couvercle* 'lifting the lid' into the sentence, and this serves to create a single event context. As shown below, sentences with canonical quantification are acceptable in single-event contexts.

(19) a. Dans cette cassette, il a trouvé beaucoup de pièces d'or
In this box, he has found a lot of pieces of gold
'In this box, he found a lot of gold pieces'

b. En soulevant le couvercle, il a trouvé beaucoup de pièces d'or
In lifting the lid, he has found a lot of pieces of gold
'Lifting the lid, he found a lot of gold pieces'

(Obenauer (1983: 78, his (42))

QAD sentences with PPs forcing a single-event reading are ungrammatical.

(20) a. *Dans cette cassette, il a beaucoup trouvé de pièces d'or
In this casette, he has a lot found of pieces of gold

b. *En soulevant le couvercle, il a beaucoup trouvé de pièces d'or
In lifting the lid, he has a lot found of pieces of gold

(Obenauer (1983: 78, his (43))

Note that QAD sentences with PPs suggesting a context where there are many events are fine[7].

(21) a. Dans cette caverne, il a beaucoup trouvé de pièces d'or
In this caverne, he has a lot found of pieces of gold
'In this cavern, he found a lot of gold pieces'

b. En cherchant partout, il a beaucoup trouvé de pièces
In searching everywhere, he has a lot found of pieces

[7]Some speakers suggest that the contrast is even more apparent with the verb *saluer* 'to greet', as in *Le délégué a beaucoup salué de militants* vs *Le délégué a salué beaucoup de militants* (cf. (Obenauer 1983), p. 83)

d'or
of gold
'Searching everywhere, he found a lot of gold pieces'
(Obenauer (1983: 78, his (45)))

In summary, we see that for a QAD sentence to be felicitous, *beaucoup* must hold of the multiple event argument.

A second way of testing for the multiplicity of events requirement is to construct a QAD sentence with a punctual predicate like *venir de* 'to just V'. Obenauer (1983) shows that while canonical quantification sentences with *venir de* are fine (22), QAD sentences with this predicate are bad (23).

(22) a. Il vient de boire beaucoup de lait
He came to drink a lot of milk
'He has just drunk a lot of milk'
b. Elle vient d'avoir beaucoup d'ennuis
She came to have a lot of troubles
'She has just acquired a lot of troubles'

(23) a. *Il vient de beaucoup boire de lait
He came to a lot drink of milk
b. *Elle vient de beaucoup avoir d'ennuis
She came to a lot have of troubles

Finally, that QAD is adverbial event quantification can be seen by the fact that QAD is impossible in stative contexts. Obenauer (1994) observes (p.121) that QAD is impossible with a stative verb like *posséder* 'to own' (24), and Burnett and Bouchard (2009) show that, in Standard French, QAD is impossible in existential constructions (25).

(24) *Jean a beaucoup possédé de chevaux
Jean has a lot owned of horses

(25) *Il y a beaucoup eu de personnes chez nous hier
It there has a lot had of people at us yesterday

Note that canonical quantification is possible with both stative verbs and existential predicates.

(26) Jean a possédé beaucoup de chevaux
Jean has owned a lot of horses
'Jean has owned a lot of horses'

(27) Il y a eu beaucoup de personnes chez nous hier
It there has had a lot of people at us yesterday

'There were a lot of people at our house yesterday'

In summary, we have seen that the quantification in QAD sentences actually involves quantification over an event variable: they are only true in contexts involving many events.

At this point, it might appear that QAD is straightforward adverbial quantification of the type observed in sentences like (28).

(28) a. J'ai beaucoup dormi
I have a lot slept
'I slept a lot'

b. J'ai beaucoup lu *La guerre et la paix*
I have a lot read War and Peace
'I read War and Peace a lot'

In these sentences, *beaucoup* appears to be a simple unary quantifier that applies to the events denoted by the VP. Perhaps, as has been previously argued by Heyd (2003) and Mathieu (2004), the *de* phrase supplies an existentially closed direct object, resulting in an interpretation for a QAD sentence as shown in (29).

(29) $[\![$ J'ai beaucoup lu de livres $]\!] = 1$ iff $BCPe(\exists x(\text{Reading}(e, I, x)\ \&\ \text{Book}(x)))$

Under this analysis, a sentence like *J'ai beaucoup lu de livres* is true just in case there are many reading events, where the speaker is the agent of the event, and there is some object x that is the theme of the event, and x is a book. So, in this analysis, QAD sentences are predicted to have a meaning closer to the English 'I did a lot of book-reading', rather than 'I read a lot of books'.

This simple analysis is appealing because, firstly, *beaucoup* occupies an adverbial position, and, secondly, as observed by Kayne (1975), all the quantifiers that participate in QAD independently exist as adverbs. Although the data presented in this section certainly suggests that QAD involves some type of adverbial quantification, in the next section, I show that the situation is not so straightforward.

4.1.2 Object Quantification

QAD does not involve simple unary adverbial quantification precisely because *J'ai beaucoup lu de livres* is not, in fact, equivalent to the English 'I did a lot of book-reading'. In this section, I show that, for a QAD sentence to be felicitous, *beaucoup* must hold not only of the predicate's event argument, but also of the direct object. On analogy to the MER, I call this generalization the *Multiplicity of Objects* requirement.

(30) ***Multiplicity of Objects Requirement:*** *(MOR)*
QAD sentences are only true in contexts involving many objects

QAD sentences involving many events but a single object are judged false. For example, (31) cannot be uttered in a context in which I called only my own mother many times.

(31) J'ai beaucoup appelé de mères
I have a lot called of mothers

It might be suggested that the MOR is not actually due to the quantifier, but rather to the plural marking on the direct object. However, we can easily see that the multiplicity requirement is different from a 'more than one' requirement which, presumably, is (at most) what the contribution of the plural morpheme would be. For example, contexts with multiple events and few objects are also judged to be false. So, it is infelicitous to say *J'ai beaucoup lu de livres* if I read my two favourite books (or even a small group of books) many times. This, combined with recent research that suggests that the semantic contribution of plural morphology is not actually to create a multiplicity interpretation (for example Spector (2007) and Bale (2009)), serves as a strong argument against deriving the MOR from the plural marking on the *de* phrase. I therefore conclude that this constraint is the due to the semantics of the quantifier applying to the direct object.

In conclusion, I have argued that, in QAD sentences in Standard European French, *beaucoup* quantifies over both the verb's event variable and its direct object variable that is restricted by the *de* phrase[8].

4.1.3 Pair Quantification

At this point, we might wonder what the relation between the object quantification and the event quantification is. In particular, we might wonder whether there is some dependency between the number of events that must count as 'a lot' and the number of objects that must count as 'a lot' for a QAD sentence to be true. If there is one, it may be possible to derive the multiplicity of events requirement from the multiplicity of objects requirement, or vice versa. Such an analysis would allow us to maintain that *beaucoup* is only applying

[8]Indeed, the obligatory plural marking on count direct objects (**beaucoup lu de livre*) may be a reflection of the quantifier directly applying to this variable (cf. **lu beaucoup de livre*)

to a property, and, therefore, there would be no need to propose that QAD involves pair quantification. In the remaining part of this section, I argue that the MER and MOR are, strictly speaking, independent of one another.

Firstly, I consider whether the multiplicity of events requirement can be derived somehow from the multiplicity of objects requirement. Perhaps QAD is truly quantification 'at a distance', i.e. the adverb *beaucoup* is actually quantifying solely over the direct object; however, the relation between the objects making up the direct object and the events supplied by the verb is interpreted as being one-to-one, so we derive the MER. Indeed, this type of situation is the most salient interpretation of a simple example like (32): each book is the theme of an event, and since there are many books, there are many events.

(32) J'ai beaucoup lu de livres
I have a lot read of books

However, situations with multiple participants do not always give rise to multiple events. For example, collective verbs like *réunir* 'to bring together' require multiple participants to form a single event (**J'ai réuni Jean* 'I brought Jean together'). In a context where I brought together many people for a big party yesterday, the QAD sentence in (33) is bad in the standard dialect, despite there being multiple objects.

(33) *Pour la fête hier, j'ai beaucoup réuni de personnes
For the party yesterday, I have a lot brought together of people

Of course it is possible to utter a QAD sentence in a situation where the number of objects outnumbers the number of events, for example, if there were many events of 'bringing together' with different people involved in every event. The point is that many participants do not induce a many events structure onto the VP. I therefore conclude that the MER cannot be derived from the MOR.

Secondly, I consider whether it is possible to derive the MOR from the MER. This is what is done by Nakanishi (2007) in her analysis of some similar data from Japanese. For example, like *beaucoup* in French, *san-nin* 'three-CL' in Japanese can appear both in the nominal domain (34-a) and in a position next to the verb (34-b), which, at first glance, results in a synonymous sentence.

(34) a. **Gakusei san-nin** -ga ie-ni kaet-ta (koto)
Student three-CL NOM home-to go-PAST (the fact that)
'Three students went home'
b. **Gakusei** -ga ie-ni **san-nin** kaet-ta (koto)
Student NOM home-to three-CL go-PAST
((Nakanishi 2007): 236)

Also like QAD, sentences with the 'split DP' *gakuseiga...sannin* are subject to the MER: when the 'breaking' or 'making' in (35-b) is interpreted as involving a single event, the split construction is infelicitous.

(35) a. **Gakusei san-nin** -ga kinoo sono isu-o
Student three-CL NOM yesterday that chair-ACC
kowasi-ta/tukut-ta (koto)
break-PAST/make-PAST
'Three students broke/made that chair yesterday'
b. ??**Gakusei** -ga kinoo **san-nin** sono isu-o
Student NOM yesterday three-CL that chair
kowasi-ta/tukut-ta (koto)
break-PAST/make-PAST
((Nakanishi 2007): 243)

Because of data like (35-b), Nakanishi also concludes that the quantification done by *san-nin* in split constructions is event quantification. Furthermore, she proposes that the inference that there were three students in (34-b) (i.e. the appearance of nominal quantification) comes from a semantic constraint on the measure functions[9] that elements like *san-nin* in split constructions are sensitive to: the *monotonicity constraint.*

(36) Nakanishi (2007)'s Monotoncity Constraint (p. 248):
A measure function μ is monotonic relative to domain E iff:
(i) there are two events e_1, e_2 such that e_1 is a proper subpart of e_2 and
(ii) $\mu(e_1) < \mu(e_2)$

In Nakanishi's analysis, the monotonicity of a measure function in the event domain (notated by μ') is calculated as follows: firstly, sub-events are ordered based on the run time of the main event. Then, following Krifka (1998), she proposes that there is a homomorphism h relating events and the objects de-

[9]Measure functions are functions from individuals or events to elements of a scale that reflect the degree to which the individuals/events have the property measured by the scale (cf. Higginbotham (1994); Krifka (1998); Schwarzschild (2002)).

noted by the event's theme. These objects are measured by another, nominal, measure function (notated by μ). The event measure function μ' is defined as the composition of μ and h:

(37) $\forall e[\mu'(e) = \mu(h(e))]$
(Krifka (1998): 97)

Thus, for all events, the amount of the event e measured by μ' is equal to the number of objects measured by μ in that event. Nakanishi proposes that, in split constructions, the measure function μ' must be monotonic. To put the analysis in the terms that I have been using to describe QAD, Nakanishi derives the 'three objects' requirement from the 'three events' requirement by means of a semantic constraint on the VPs that the quantifier can apply to: the ordered subparts of the event in (34-b) must be homomorphic to the the ordered subgroups in the denotation of the NP.

However, a Nakanishi-style analysis will not work for Quantification at a Distance in Standard French. This is particularly because monotonicity of the event measure function is not a characteristic of this construction. This was first noticed by Doetjes (1995), although she does not describe it this way[10]. Doetjes observed that sub-events and objects do not have to line up in a one-to-one way across the course of the main event. In particular, 'recycling' of objects is permitted in order to satisfy the MER, provided that the total number or total amount denoted by the *de* phrases is higher than some critical standard amount. For example, the sentence below is perfectly felicitous if the fountain keeps spouting the same water over and over again.

(38) Pendant ces dix minutes, la fontaine a beaucoup craché
For these ten minutes, the fountain has a lot spouted
d'eau
of water
((Doetjes 1995): 117)

It is easy to see that, in examples like (38), the measure function μ' associated with the VP that *beaucoup* applies to is not monotonic.[11]

[10]Doetjes has a theory of the syntax of QAD which, from a semantic point of view, is not necessarily incompatible with my own. However, see Burnett (2009) for a full description of this theory, as well as arguments that, in its current form, it is insufficient to describe the variety of QAD-like configurations that exist in both dialects of French.

[11]PROOF: Suppose that, with every spout, the fountain uses up all of the water in its pool. Call this (large) amount of water w. Now consider the sub-events of water spouting that consist of the first and second spouts, call them e_1 and e_2. So $e_1 < e_2$ in the (sub)-event lattice, and $h(e_1) = w = h(e_2)$. Applying the nominal measure function μ yields $\mu(h(e_1)) = \mu(h(e_2))$. Recall that, in Nakanishi's system, the event measure function μ'

Note that, while recycling of objects is permitted, it is only allowed to the extent that the cardinality of the direct object respects the MOR. The sentence in (38) can be uttered if the same amount of water is spouted over and over again *only* if this amount is, itself, large.[12] So a situation in which a small amount of water (for example a couple of drops or even a glass-full) were to spout over and over again would not be felicitously described by (38).

We can also see examples of non-monotonicity with count direct objects. Consider, again, QAD sentences with the collective verb *réunir*. We saw above that a sentence like (39) is bad in a single event context even if there are many people involved; however, a multiple-event context with few participants is still insufficient.

(39)	J'ai	beaucoup	réuni	de personnes
	I have	a lot	brought together	de people

For example, suppose that I am a matchmaker (*entremetteuse*), and my job is to set couples up on dates. Consistent with the MOR, it is inappropriate to use a QAD sentence to describe the situation in which I accidentally set up the same two people on many dates. Nevertheless, for the sentence to be true, it is not the case that I must have many clients and that every single person is paired up only once. Suppose that I want to describe my life's work, and so I say "During my long career as a matchmaker..." (40).

(40) Pendant ma longue carrière d'entremetteuse, j'ai beaucoup réuni de personnes

It is possible, and, in this situation, expected, that I would pair up at least a subset of my clients more than once. Thus, in the situation instantiated by (40), the cardinality of the set of 'bringing together' events is greater than the cardinality of people. Note, again, that this 'participant recycling' is only possible if the total number of my clients is large. I therefore conclude that some sort of monotonicity or event-object homomorphism constraint cannot derive the MOR from the MER, since these constraints do not hold in the QAD construction.

In summary, I have argued that the MER and the MOR constitute independent requirements on the domain of the adverbial quantifier *beaucoup*. Furthermore, I presented cases where QAD sentences are felicitous with VPs

is equivalent to the composition of the event-object homomorphism h and the nominal measure function μ. So, $\mu'(e_1) = \mu'(e_2)$, and, by (36), μ' fails to be monotonic. $\square$

[12] This particular example involves a mass noun. I assume that the cardinality of mass terms can be evaluated parallelly to the cardinality of count terms, for example with the use of measure functions in the way proposed in Higginbotham (1994) (cf. pp. 461-462 for his definition of *much*).

denoting a variety of event-object relations, both bijective (as in the simple *J'ai beaucoup lu de livres* example) and non-bijective (as in 'recycling' sentences like *la fontaine a beaucoup craché d'eau*). What remains constant throughout all of these examples is that the cardinality of both the set of events and the set of objects must be percieved as 'a lot'. In other words, the construction seems to be agnostic as to the precise relations on the sets of events and objects denoted by the VP and only cares about the size of these sets.

4.2 Analysis

In this section, I present a semantic analysis of the QAD construction in SF. I propose that QAD sentences in this dialect should be modeled with a binary quantifier BCP^{SF}, which I then prove to be unreducible. I then suggest a compositional analysis for the construction, one that is based on previous proposals for the syntactic and semantic analysis of *de* phrases in argument position.

However, I first present my assumptions concerning the unary use of the adverb *beaucoup* as an event quantifier.

4.2.1 The Analysis of Unary Adverbial *beaucoup*

In this section, I present a semantic analysis of the unary use of the adverb *beaucoup*, the one that appears in simple event quantification contexts like (41).

(41) a. J'ai beaucoup dormi
I have a lot slept
'I slept a lot'

b. Brutus a beaucoup poignardé César
Brutus has a lot stabbed Caesar
'Brutus stabbed Caesar a lot'

I follow much recent work that supposes that completed VPs denote sets of events (Parsons (1990); de Swart (1991); Zwarts (2006) *inter alia*). In particular, I assume that verbs have a 'neo-Davidsonian' argument structure similar to the one proposed in Parsons (1990) (42) for the sentence *Brutus a poignardé César* 'Brutus stabbed Caesar'.

(42) $\exists e(\text{Stabbing}(e)\ \&\ \text{Agent}(e, B)\ \&\ \text{Theme}(e, C))$ (Parsons (1990): 14))

Thus, a transitive verb like *poignarder* 'to stab' denotes a set of triples:

(43) $[\![\text{ poignarder }]\!] = \{< x, y, e >: \text{Stabbing } (e) \text{ \& Subject}(e, y) \text{ \& Object}(e, x)\}$

Since this is rather long, I will adopt a notational convention by which, for (43), I will simply write,

(44) $[\![\text{ poignarder }]\!] = \{< x, y, e >: \text{Stabbing } (e, y, x)\}$

In sentences without adverbial quantifiers, like (42), I assume an *existential closure* operation that targets the event argument.

In the spirit of de Swart (1991), I assume that eventive adverbs are generalized quantifiers over sets of events. In addition, following Peters and Westerstahl (2006), I assume that what differentiates degree quantifiers like *beaucoup* from other intersective quantifiers like *trois fois* 'three times' is that degree quantifiers are *extremely context dependent*: They require a contextual 'standard' parameter for the truth of sentences containing them to be evaluated. Therefore, when degree quantifiers like *beaucoup* and *peu* occur as VP modifiers (45), I propose that they denote the functions in (46).

(45) a. J'ai beaucoup dormi
I have a lot slept
'I slept a lot'

b. Je suis peu allée au cinéma l'année passée
I was little gone to the cinema the year last
'I rarely went to the movies last year'

(46) a. Let $s_1 \in \mathbb{N}$.
For all $P \in \mathcal{P}(E)$ $BCP^1_{s_1}(P) = 1$ iff $\mid P \mid > s_1$

b. Let $s_2 \in \mathbb{N}$.
For all $P \in \mathcal{P}(E)$ $PEU^1_{s_2}(P) = 1$ iff $\mid P \mid < s_2$

Thus, a sentence like *Brutus a beaucoup poignardé César* 'Brutus stabbed Caesar a lot' is true just in case BCP^1 with the parameter s_1 holds of the set of events in which Brutus stabbed Caesar.

(47) $[\![\textit{Brutus a beaucoup poignardé César}]\!] = 1$ iff $BCP^1_{s_1}(\{e : \text{Stabbing}(e, B, C)\}) = 1$

4.2.2 The Analysis of Binary Adverbial *beaucoup*

I now provide a semantic analysis of the adverb *beaucoup* when it combines with VPs containing *de* phrase direct objects. To account for the properties of QAD in SF, I propose that the adverbial quantifier BCP^1 is extended to deal with binary relations in the following way:

(48) Let $s, t \in \mathbb{N}$ such that $0 < s, t <\mid E \mid$,
For all $R \in \mathcal{P}(E \times E)$, $BCP^{SF}_{s,t}(R) = 1$ iff $BCP^1_s(Dom(R)) = 1$ & $BCP^1_t(Ran(R)) = 1$

BCP^{SF} takes a set of <event, object > pairs and yields true just in case the cardinality of the set of first co-ordinates is a lot relative to an event standard, and the cardinality of the set of second co-ordinates is also a lot relative to an object standard.

(49) $[\![$ J'ai beaucoup lu de livres $]\!]$ = 1 iff $\mid \{e$: Reading (e, I, x) & Book$(x) \mid > s$ & $\mid \{x$: Reading (e, I, x) & Book$(x) \mid > t$

J'ai beaucoup lu de livres is true just in case there were many events of me book-reading, and I read many books. Thus, I accurately account for both the multiplicity of events requirement and the multiplicity of objects requirement, since these requirements are straightforwardly built into the meaning of the quantifier.

Besides the fact that it gets the interpretations of QAD sentences right, the main argument for a binary quantification approach to QAD is the following fact about BCP^{SF}.

(50) **Theorem 1:** BCP^{SF} is unreducible to any iteration of unary quantifiers.

The proof of Theorem 1 is given in Appendix 1. Informally speaking, BCP^{SF} is unreducible because it is true of relations in which there are many events with few or even a single participant in each event, provided that the total number of participants is large enough to count as *beaucoup.* The iteration of two unary quantifiers, say the composition of two occurrences of the arity reducing lift of BCP^1, builds in a scope dependency between the two quantifiers. Such a binary quantifier is only true of relations in which there are many events with many participants. In QAD sentences; however, there is no such dependency. This is why QAD in Standard French must be modeled with polyadic quantifiers.

In summary, I proposed that the adverb *beaucoup* in Standard French has an extension to binary relations that I have shown to be properly polyadic. Note that I am not proposing the existence of two homophonous adverbs in the language, one that quantifies over events (BCP^1), and one that quantifiers over <event, object> pairs (BCP^{SF}). Since the domains of BCP^1 and BCP^{SF} are disjoint, their union ($BCP^1 \cup BCP^{SF}$) will still be a function, and thus an appropriate denotation for a single lexical item. Thus, the precise denotation of $beaucoup_{Adv}$ that I propose can be stated more explicitly below as the function $BCP^{SF'}$.

(51) **Standard French**:
$[\![\; beaucoup_{Adv} \;]\!] =$ the function $BCP^{SF'}$, defined as follows:
Let $s, t \in \mathbb{N}$ such that $0 < s, t <| E |$,
For all $P \in \mathcal{P}(E^e)$, $BCP^{SF'}_s(P) = 1$ iff $| P |> s$
For all $R \in \mathcal{P}(E^e \times E^x)$, $BCP^{SF'}_{s,t}(R) = 1$ iff $| Dom(R) |> s$ & $| Ran(R) |> t$

This single lexical item uniformly attaches to VPs, whether they denote properties or relations, and returns a truth value based on the conditions stated above.

As stated in the introduction, the main focus of this paper is *beaucoup*, and, for the argument that I am making, showing that this lexical item is polyadic is sufficient. However, we might wonder whether polyadicity is a property that holds of only *beaucoup* or of the entire class of degree quantifiers. In fact, there does seem to be a difference between some members of this class. In particular, some of my speakers of European French (i.e. those that have polyadic *beaucoup*) find a QAD sentence with *tellement* 'so much' ok in single event contexts.

(52) En soulevant sa couverture, Jean a **tellement** trouvé de
In lifting his blanket, Jean has so much found of
cafards qu'il s'est enfuit
cockroaches that he him is fled
'Lifting the blanket, Jean found so many cockroaches that he fled'

Nevertheless, at the same time, they refuse single-event contexts with the degree quantifier *trop* 'too much'.

(53) *En soulevant sa couverture, Jean a **trop** trouvé de
In lifting his blanket, Jean has too much found of
cafards pour continuer son ménage
cockroaches for continuing his cleaning
(Intended: Lifting his blanket, Jean found too many cockroaches to continue his cleaning)

Therefore, there may be some generalization that groups together a subset of degree quantifiers that display the MER (like *beaucoup* and *trop*) against those that do not (like *tellement*). However, I leave the study of this observation to further research.

In the next section, I give a compositional analysis for QAD and show how $BCP^{SF'}$ combines with a relational VP to create the proper interpretation.

4.2.3 A Compositional Analysis

I now present a compositional analysis of Quantification at a Distance in Standard French. Theorem 1 in the previous section strongly suggests that the *de* phrases cannot be interpreted as regular quantified noun phrases. Indeed, the intuition that *de* phrases are not scope-bearing elements is present in much of the literature on these elements. For example, Heyd (2003), Mathieu (2002), and Mathieu (2004) propose that *de* phrases denote bare properties. These authors claim that the *de* phrases in French undergo *semantic incorporation*: a semantic process that accompanies syntactic incorporation in languages like Inuktitut (54).

(54) Amajaraq **eqalut** -tur -p -u -q
Amajaraq.ABS salmon eat IND [-tr] 3SG
'Amajaraq has eaten a salmon' (van Geenhoven (1998); cit. Mathieu (2004a))

Semantic incorporation has been proposed to occur independently of syntactic incorporation in a number of languages, mostly to account for the semantic behaviour of 'bare' nominals. For example, Van Geenhoven proposes that English bare plurals (55) are semantically, but not syntactically, incorporated.

(55) I read books

Heyd and Mathieu provide a number of arguments for the claim that *de* phrases are semantically incorporated. Their most important one comes from the inability of *de* phrases to take scope higher than their the position in which they appear. For example, *de* phrases may never take scope over negation.

(56) Je (n')ai pas lu de livres
I (NEG) have not read of books
'I did not read any books' **not** *'There were books that I did not read'*

Similarly, as first noticed in Haïk (1982), *de* phrases in QAD sentences must also take scope lower than negation.

(57) Je (n')ai pas beaucoup lu de livres
I NEG-have not a lot read of books
'It is not the case that I read a lot of books'

Note, for comparison, that the DP containing *de livres* is free to scope wherever it wants in the canonical sentence.

(58) Je (n')ai pas lu beaucoup de livres
I NEG-have not read a lot of books
'It is not the case that I read a lot of books' or
'There are a lot of books that I haven't read'

Furthermore, the *de* phrase in a QAD sentence must obligatorily scope underneath an intensional verb like *chercher* 'to look for'. The scopal inertia of *de* phrases can be further seen in sentences with an intensional verb like *chercher* 'to seek'. In these constructions, *de* phrases must always be interpreted *de dicto*.

(59) J'ai beaucoup cherché de livres pour mon travail de syntaxe
I have a lot sought of books for my paper of syntax
'I looked for a lot of books for my syntax paper'

a. ...parce qu'une longue bibliographie donne l'air intelligent
...because a long bibliography gives the air intelligent
'...because a long bibliography makes one look smart'

b. *...notamment, Kayne (1975), Milner (1978), Rizzi (1990), et de Swart (1993)
...notably Kayne (1975), Milner (1978), Rizzi (1990), and de Swart (1993)
**'...notably Kayne (1975), Milner (1978), Rizzi (1990), and de Swart (1993)'*

Heyd proposes that verbs selecting *de* phrase complements are *incorporating* verbs, and, as such, they have the argument structure in (60).

(60) $\lambda P_{<e,t>}.\lambda x_e.\exists y[V(x,y)\&P(y)]$ (Heyd (2003: 199, her (57))

Adapting (60) for the present, the denotation of the VP *lire de livres* has the form in (61).

(61) $[\![$ lire de livres $]\!] = \lambda y\lambda e.\exists x(\text{Reading } (e,y,x)\ \&\ \text{Book}(x))$

Presumably, the subject combines with the predicate, and then negation is applied to the event variable. Therefore, the denotation of *Je (n')ai pas lu de livres* 'I did not read any books' would be as represented in (62)

(62) $[\![$ Je (n')ai pas lu de livres $]\!] = NO(\lambda e\exists x(\text{Reading}(e,I,x)\ \&\ \text{Book}(x)))$

For Mathieu, the semantic incorporation of *de* phrases is not governed by verbal lexical semantics, but, rather, is a freely occurring process. In his analysis, the determiner *de* is not semantically a determiner; it is "a morphological spell-out of incorporation" (Mathieu (2004): 7). Despite this difference in implementation, his analysis assigns the same meanings to sentences containing *de* phrases as Heyd's.

Both of these authors suggest extending their proposal of semantic incorporation to the analysis of the QAD construction. In such an extension, *beaucoup* is presumably treated as a unary event quantifier, and, therefore, a QAD sentence would be assigned the interpretation in (63).

(63) $[\![$ J'ai beaucoup lu de livres $]\!] = BCP(\lambda e \exists x(\text{Reading } (e, I, x) \ \& \ \text{Book}(x)))$

We saw in the previous section that this is not the correct analysis for the semantics of QAD sentences (since it does not encode the MOR), and, thus, an Inuktitut-style incorporation analysis for French *de* phrases does not quite account for the data. However, based on the scopal inertia of these indefinites, I assume that the intuition that *de* is a semantically 'deficient' determiner presented in the incorporation analysis is right, and, following Heyd & Mathieu, I assume that *de* phrases denote bare properties. However, in contrast to the incorporation analysis, I propose that combining the verb and the *de* phrase does not existentially close the direct object. Instead, I propose that *de* phrases in object position are combined with the verb via an unsaturating compositional rule such as Chung & Ladusaw (2004)'s *Restrict*.

To account for scopally inert direct objects in incorporation-type contexts, Chung & Ladusaw (p.5) propose the following,

> We define a binary operation that composes a predicate directly with a property to yield a predicate without changing the degree of unsaturation...We call this mode of composition *Restrict* and illustrate it in [(64)].

(64) *Restrict* ($\lambda y \lambda x$ [feed' $(y)(x)$], dog')
$= \lambda y \lambda x$ [feed' $(y)(x) \wedge$ dog'(y)]

In many of their examples, Chung & Ladusaw apply *existential closure* (EC) immediately after they apply *Restrict*. However, if one were to not apply EC immediately after, but rather to feed another argument (the subject) to the predicate $\lambda y \lambda x[feed(y)(x) \wedge dog(y)]$, then the subject would be interpreted as the object, which is the wrong result. So we need to add something to the definition of *Restrict* that moves the argument that is being restricted to the end of the sequence that constitutes the verb. I therefore propose that *de* phrases are combined with the verb via *Restrict'*

(65) **Restrict':**
For nodes β and γ such that $[[\beta]] = \{< v_1, v_2...v_n >: P(v_n, v_{n-1}...v_1)\}$ and $[[\gamma]] = \{v_k : Q(v_k)\}$, then $[[Merge(\beta, \gamma)]] = \{< v_2, v_3...v_n, v_1 >:$

$P(v_n, v_{n-1}...v_1)$ & $Q(v_1)\}$

Chung & Ladusaw are conscious of this consequence of their formulation of *Restrict*, and so assume the following: "Let us therefore adopt the notational assumption that when an argument is targeted by a composition operation, it is possible to demote it from the top of the lambda prefix to a position just above the event argument." (p. 10). I assume *Restrict'* since it gives no special status to the event argument, but Chung & Ladusaw's "notational assumption" would also be compatible with my proposal.

Under this analysis, the *de* morpheme can be viewed as the spell-out of the application of *Restrict'*. Assuming *Restrict'*, the derivation of the QAD sentence is straightforward.

(66) J'ai beaucoup lu de livres

- $BCP^{SF'}_{s,t}(\{< e, x >\text{: Reading } (e, I, x) \ \&\ \text{Book}(x)\})$
  - $BCP^{SF'}_{s,t}$
  - $\{< e, x >\text{: Reading } (e, I, x) \ \&\ \text{Book}(x)\}$
    - I
    - $\{< y, e, x >\text{: Reading}(e, y, x) \ \&\ \text{Book}(x)\}$
      - $\{< x, y, e >\text{: Reading}(e, y, x)\}$
      - $\{x : \text{Book}(x)\}$

(66) shows how the binary quantifier applies to the main predicate creating the correct interpretation; however, why can we not apply the unary *beaucoup* to the event argument and then later existentially close the direct object? I propose that such a derivation is impossible because existential closure for individuals is not generally available in French. One argument for this position comes from the distribution of *de* phrases themselves. As briefly mentioned in section 3, their presence in the language is very restricted. For example, it is not possible to existentially close a bare *de* phrase (67).

(67) *Jean a lu de livres
Jean has read *de* books
Intended: 'Jean read books'

The licensing conditions of *de* phrases are somewhat complex[13], and their analysis is out of the scope of this paper; however see Burnett (2010) for an approach that ties the distribution of *de* phrases to their ability to be bound by other quantifiers in the language.

If there is no free existential closure for individuals in French, then we correctly predict the impossibility of applying unary *beaucoup* to a VP containing a *de* phrase: since *de* phrases do not saturate the argument position with which they combine, VPs with these NPs contain open variables that must be bound by some other operator. If only unary *beaucoup* combines with such a VP, it will only bind the event argument, leaving the direct object argument unbound. Thus the denotation of the entire structure in (68) would be a property, not a truth value.

(68) A unary analysis of *J'ai beaucoup lu de livres*

[13]For example, the addition of a prenominal (but not postnominal) adjective like *bon* 'good' renders the sentence in (67) grammatical: *Jean a lu de bons livres*.

$\{x : BCP^1 e(\text{Reading } (e, I, x) \ \& \ \text{Book}(x))\}$

BCP^1 $\{< e, x >: \text{Reading } (e, I, x) \ \& \ \text{Book}(x)\}$

I $\{< y, e, x >: \text{Reading}(e, y, x) \ \& \ \text{Book}(x)\}$

$\{< x, y, e >: \text{Reading}(e, y, x)\}$ $\{x : \text{Book}(x)\}$

5 Quantification at a Distance in Québec French

In this section, I examine the interpretations of Quantification at a Distance sentences in Québec French. Following Cyr (1991) and Burnett (2009), I show that QF QAD is subject to one fewer requirement than SF QAD. I then show that this difference has an important consequence for the type of quantifier that is needed to model the interpretations assigned to the construction in the Canadian dialect. In particular, I argue that $beaucoup_{Adv}$ in Québec French is exclusively a unary quantifier.

5.1 Data

In this section, I present a major dialectal difference between QAD sentences in Standard French and the dialect spoken in Québec. As noticed by Cyr, QAD sentences in QF are not subject to the *Multiplicity of Events* requirement, repeated in (69)

(69) ***Multiplicity of Events Requirement:***
QAD sentences are only true in contexts involving multiple events

The single-event sentences presented by Obenauer, judged ungrammatical in the standard dialect, are grammatical in QF.

(70) a. Dans cette cassette, il a beaucoup trouvé de pièces d'or
In this box, he has a lot found of pieces of gold
b. En soulevant le couvercle, il a beaucoup trouvé de pièces d'or
In lifting the lid, he has a lot found of pieces of gold
(Obenauer (1983: 78, his (43))

Similarly, in the Québec dialect, sentences with the predicate *venir de* (71) are fine, and single event readings of collective predicates (72) are possible.

(71) a. Il vient de beaucoup boire de lait
He came to a lot drink of milk
'He just drank a lot of milk'

b. Elle vient de beaucoup avoir d'ennuis
She came to a lot have of troubles
'She has just gotten a lot of troubles'

(72) Pour le party hier, j'ai beaucoup réuni de personnes
for the party yesterday, I have a lot reunited of people
'For the party yesterday, I brought together many people'

Note that QAD sentences are still felicitous in multiple event contexts in QF.

(73) Pendant ma longue carrière d'entremetteuse, j'ai beaucoup
During my long career of matchmaker, I have a lot
réuni de personnes
reunited of people
'During my long career as a matchmaker, I have brought together a lot of people'

Finally, as shown by Burnett (2009), in Québec French, QAD is possible with stative predicates (74), and existential constructions (75).

(74) Jean a beaucoup possédé de chevaux
Jean has a lot owned of horses
'Jean has owned many horses'

(75) Y a beaucoup eu de personnes chez nous hier
there has a lot had of people at us yesterday
'There were many people at our house yesterday'

In summary, the main difference between Québec French and Standard French is that, in the Canadian dialect, QAD sentences are not subject to a multiplicity of events requirement.

We do however see a multiplicity of objects requirement in QF.

(76) ***Multiplicity of Objects Requirement:***
QAD sentences are only true in contexts involving multiple objects

For no speakers of this dialect, is it possible to utter (77) in a context where I have called a single mother many times.

(77) J'ai beaucoup appelé de mères
I have a lot called of mothers

In conclusion, I have shown, following Cyr (1991) and Burnett (2009), that while SF QAD with *beaucoup* involves a binary quantifier that imposes a 'many' requirement on both co-ordinates, QF *beaucoup* only imposes this requirement on the object co-ordinate.

5.2 Analysis

The data from Québec French can be modeled with the following binary quantifier over $< event, object >$ pairs (where s is some contextual parameter).

(78) For all $R \in \mathcal{P}(E \times E), BCP_s^{QF}(R) = 1$ iff $BCP_s^1(Ran(R)) = 1$

5.3 Binary Quantification?

We could, in principle, adopt a binary quantification analysis for QAD in Québec French; however, unlike in Standard French, BCP^{QF} *is* reducible to iterations of unary quantifiers, $\exists$ and the type $< 1 >$ BCP^1.

(79) **Theorem 2:** BCP^{QF} is reducible to $BCP^1 \circ \exists$.

The proof of Theorem 2 is given in Appendix 2.

In this section, I argue that the meaning of *J'ai beaucoup lu de livres* in Québec French is better modeled using two different quantifiers, yielding the logical representation in (80).

(80) $[\![$ J'ai beaucoup lu de livres $]\!] = BCP_s^1 x \; \exists e(\text{Reading } (e, I, x) \;\&\; \text{Book}(x))$

Furthermore, I argue that a unary analysis of *beaucoup* in Québec French accounts for another difference between the two dialects: the availability of QAD with psychological predicates (Obenauer calls these *degree predicates*).

As first observed by Obenauer (1983), QAD sentences in Standard European French are subject to 'intervention' effects from a certain class of predicates. In this dialect, verbs like *apprécier* 'to appreciate', *impressioner* 'to impress', *accélérer* 'to accelerate', *inquiéter* 'to worry', and *regetter* 'to regret' block QAD.

(81) a. *Le critique a peu apprécié de films
The critic has little appreciated of movies

b. *Son regard a beaucoup impressioné de minettes
His look has a lot impressed of chicks

c. *La réorganisation a beaucoup accéléré de procédures
The reorganization has a lot sped up of procedures

d. *La nouvelle a beaucoup inquiété d'experts
The news has a lot worried of experts

e. *Une fois installé loin de la ville, il a beaucoup regretté
One time set up far from the city, he has a lot regretted
d'amis
of friends

(Obenauer (1983: 70, his (12))

Canonical quantification sentences with the *apprécier* class of verbs are perfectly grammatical.

(82) a. Le critique a apprécié peu de films
The critic has appreciated little of movies
The critic appreciated few movies

b. Son regard a impressioné beaucoup de minettes
His look has impressed a lot of chicks
'His look impressed a lot of chicks

c. La réorganisation a accéléré beaucoup de procédures
The reorganization has sped up a lot of procedures
'The reorganization sped up a lot of procedures'

d. La nouvelle a inquiété beaucoup d'experts
The news has worried a lot of experts
'The news worried a lot of experts'

e. Une fois installé loin de la ville, il a regretté beaucoup
One time set up far from the city, he has regretted a lot
d'amis
of friends
'Once he was set up far from the city, he missed a lot of friends'

(Obenauer (1983: 71, his (14))

In Québec French, however, psychological predicates do not intervene. Cyr (1991) claims that the interference provided by these verbs does not occur at all in this dialect. She gives the following examples of QAD sentences with psychological predicates.

(83) a. ?Ce jeune peintre a beaucoup impressioné de connaisseurs
this young painter has a lot impressed of connaisseurs
'This young painter impressed a lot of connaiseurs

b. ?On a trop regretté de décisions
we have too regretted of decisions

'We regretted too many decisions'

c. La situation à Oka a pas mal inquiété de citoyens
the situation at Oka has not bad worried of citizens
'The situation at Oka has worried a fair number of citizens'

She reports that, after consulting around 10 speakers, (83-c) was accepted by all of them, and (83-a) and (83-b) were accepted by the majority.

I propose that we can attribute this dialectal variation to a difference in the arity of *beaucoup*$_{Adv}$ between SF and QF. As noted by Obenauer (1983), the definition of the class of verbs that block QAD is not arbitrary: the verbs that block QAD in SF fall into a natural semantic class. Specifically, the verbs that do not allow quantification at a distance in the European dialect are those that impose an 'intensely' interpretation on the verb, not an 'often' interpretation. As shown below, when *beaucoup* is used with a member of the *apprécier* class, it quantifies not over events, but over something like degrees. In a sentence with simple adverbial modification, in both dialects, *beaucoup* may only have a 'high degree' reading, not a frequency reading.

(84) a. Le critique a beaucoup apprécié ce film
the critic has a lot appreciated this movie
'The critic appreciated this movie to a high degree' not *often*

b. Son regard a beaucoup impressioné cette minette
His look has a lot impressed this chick
'His look impressed this chick to a high degree'

c. La réorganisation a beaucoup accéléré cette procédure
The reorganization has a lot sped up this procedure
'The reorganization has sped up this procedure to a high degree'

This data suggests that, in addition to an event argument, all these predicates contain a degree argument, and that it is this degree argument interferes with QAD in SF, but not in QF.

If, as I have argued in section 4, *beaucoup* in SF has a domain composed exclusively of unary and binary relations, we expect it to be incompatible with VPs made up of verbs from the *apprécier* class with *de* phrase direct objects. Since *de* phrases combine with verbs through a non-saturating compositional rule, and verbs like *apprécier* contain an extra degree argument, a vP like *le critique apprécier de films* will denote a ternary relation, something that is not in the domain of $BCP^{SF'}$.

However, if, in QF, *beaucoup*$_{Adv}$ can be a unary quantifier whose domain contains individuals, it can be merged after all the other arguments of the predicate are satisfied. Thus, the presence of a degree argument on the verb should not interfere in the way that is does in SF.

I therefore propose that, in QF, the adverb *beaucoup* has no polyadic extension: it is simply a type $< 1 >$ quantifier that takes properties to truth values. However, the QF *beaucoup* has a large domain composed of properties of events and objects.

(85) **Québec French:**
$[\![\, beaucoup_{Adv}]\!]$ = the function BCP^{QF}, defined as follows:
Let $s \in \mathbb{N}$ such that $0 < s <| E |$,
For all $P \in \mathcal{P}(E)$, $BCP^{QF}_s(P) = 1$ iff $| P |< s$

In section 3, I argued that the syntax of the QAD construction in QF was the same as in SF; therefore, the compositional analysis for a QF QAD sentence like *J'ai beaucoup lu de livres* is the one shown in (86).

(86) J'ai beaucoup lu de livres (Québec French)

$BCP_s^{QF}(\{x : \exists e(\text{Reading}(e, I, x) \ \& \ \text{Book}(x))\})$

BCP_s^{QF} $\{x : \exists e(\text{Reading}(e, I, x) \ \& \ \text{Book}(x))\}$

$\exists$ $\{< e, x >: \text{Reading}(e, I, x) \ \& \ \text{Book}(x)\}$

I $\{< y, e, x >: \text{Reading}(e, y, x) \ \& \ \text{Book}(x)\}$

$\{< x, y, e >: \text{Reading}(e, y, x)\}$ $\{z: \text{Book}(z)\}$

This is, indeed, the correct interpretation for the Québec French QAD sentence.

6 Conclusion

In this paper, I presented a novel semantic analysis of the *Quantification 'at a distance'* construction in both Standard European French and Québec French. Specifically, I proposed that QAD sentences in the European dialect involve an unreducible binary quantifier over <event, object> pairs, and that the same construction in the Canadian dialect involves a unary quantifier over individuals. Additionally, I showed how the particular interpretations assigned to these sentences could be derived compositionally based on independent proposals about the syntax and semantics of quantifiers and weak indefinites in French.

More broadly, I argued that the micro-comparative approach has an important place in the study of semantic universals. I provided a concrete case of the contribution of the study of dialectal variation in the semantic module of the grammar to the theory of the constraints on the denotations of individual lexical items in human languages. In particular, I argued that the variation observed in the interpretation of QAD sentences between Standard French and Québec French suggests that polyadicity can be a lexical property. This claim has not been explicitly made before, and, in fact, the majority of the examples of properly polyadic quantification in the literature would seem to suggest that polyadicity is a phrasal phenomenon. I argued that arriving at such a result was possible due to the microcomparative method, since the study of semantic variation in mutually intelligible dialects allows us a unique opportunity to isolate the contribution of atomic syntactic expressions in a way that is not generally possible in typological approaches.

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Appendix 1: The Unreducibility of BCP^{SF}

In this section, I show that the binary extension of BCP^1 proposed above is unreducible. The proof employs Keenan (1992)'s *reducibility equivalence* theorem (87).

(87) **Reducibility Equivalence (RE)** (Keenan (1992): 211)
For F, G reducible functions of type $< 2 >$, $F = G$ iff for all subsets P, Q of E, $F(P \times Q) = G(P \times Q)$.

(87) says that, for two reducible binary quantifiers, if they behave the same way on the product relations, then they are the same function. This theorem is frequently used to show unreducibility in the following way: the binary quantifier in question is paired with an obviously reducible quantifier, usually the composition of two unary quantifiers[14], and it is shown that these two

[14] cf. Dekker (2003) for a reliable method for constructing the relevant quantifier.

quantifiers return the same values on the product relations. It is then shown that the two quantifiers are not in fact the same function, namely that there is some non-product relation at which the quantifiers take different values.

I first show that the binary quantifier in (49) takes the same values at the product relations as an obviously reducible binary quantifier. In order to construct this quantifier, I lift BCP^1 to the generalized quantifier BCP^{GQ} (88).

(88) For all $R \in \mathcal{P}(E_1 \times ... \times E_{n+1})$, $BCP^{GQ}_s(R) = \{< a_1, ..., a_n >: BCP^1_s(\{b :< a_1, ..., a_n, b >\in R\}) = 1\}$

The definition of BCP^1 is repeated in (89).

(89) Let $s \in \mathbb{N}$ such that $0 < s <\mid E \mid$,
For all $P \in \mathcal{P}(E)$, $BCP^1_{s_1}(P) = 1$ iff $\mid P \mid > s$

where s_1 is some contextually given 'standard' for the cardinality of P. Since BCP^{GQ} and BCP^1 are identical on unary relations, we can rephrase the definition of BCP^{SF}:

(90) For all $R \in \mathcal{P}(E \times E)$, $BCP^{SF}_{s,t}(R) = 1$ iff $BCP^{GQ}_s(Dom(R)) = 1$ & $BCP^{GQ}_t(Ran(R)) = 1$

Since $BCP^{SF}_{s,t}$ contains free variables, I state the unreducibility theorem as a claim about the possible values of these variables. Note that the trivial cases, where the values for the contextual standard inside *beaucoup* are smaller than 2 or greater than $\mid E \mid -1$, are, in fact, reducible.

(91) **Theorem 1:**
For all $s, t \in \mathbb{N}$, such that $0 < s, t <\mid E \mid$, $BCP^{SF}_{s,t}$ is unreducible.

PROOF: Let $m, n \in \mathbb{N} : 0 < m, n <\mid E \mid$ to show that $BCP^{SF}_{m,n}$ is unreducible.

I first show, in (92), that $BCP^{SF}_{m,n}$ and the reducible quantifier $BCP^{GQ}_m \circ BCP^{GQ}_n$ take the same values at the product relations.

(92) **Lemma 1:** For all $P, Q \in \mathcal{P}(E), BCP^{SF}_{m,n}(P \times Q) = BCP^{GQ}_m \circ BCP^{GQ}_n(P \times Q)$

PROOF: Let $A, B \in \mathcal{P}(E)$ to show $BCP^{SF}_{m,n}(A \times B) = BCP^{GQ}_m \circ BCP^{GQ}_n(A \times B)$.
Case 1: Suppose $BCP^{SF}_{m,n}(A \times B) = 1$. Then $BCP^{GQ}_m(A) = 1$ and $BCP^{GQ}_n(B) = 1$. Since $BCP^{GQ}_n(B) = 1$, $BCP^{GQ}_n(A \times B) = A$. Since

$BCP_m^{GQ}(A) = 1$, $BCP_m^{GQ} \circ BCP_n^{GQ}(A \times B) = 1$ $\square$.
Case 2: Suppose $BCP_{m,n}^{SF}(A \times B) = 0$. Then $BCP_m^{GQ}(A) = 0$ or $BCP_n^{GQ}(B) = 0$
Case 2a: $BCP_n^{GQ}(B) = 0$. Then $BCP_n^{GQ}(A \times B) = \emptyset$, and, since BCP_m^{GQ} is positive[15], $BCP_n^{GQ}(A \times B) = A$. Since $BCP_m^{GQ}(A) = 1$, $BCP_m^{GQ} \circ BCP_n^{GQ}(A \times B) = 0$ $\square$
Case 2b:$BCP_m^{GQ}(A) = 0$and $BCP_n^{GQ}(B) = 1$. $BCP_n^{GQ}(A \times B) = \{a : BCP_n^{GQ}(aA \times B) = 1\}$. Since $A \times B$ is a product relation, $aA \times B = B$, for all $a \in A$. Since $BCP_n^{GQ}(B) = 1$,$BCP_n^{GQ}(A \times B) = A$. Since $BCP_m^{GQ}(A) = 0$, $BCP_m^{GQ} \circ BCP_n^{GQ}(A \times B) = 0$ $\square$.
Therefore, for all $P, Q \in \mathcal{P}(E)$, $BCP_{m,n}^{SF}(P \times Q) = BCP_m^{GQ} \circ BCP_n^{GQ}(P \times Q)$.$\square$

I now show, however, that $BCP_{m,n}^{SF}$ is not the same function as $BCP_m^{GQ} \circ BCP_n^{GQ}$, namely that there is some non-product relation at which $BCP_{m,n}^{SF}$ and $BCP_m^{GQ} \circ BCP_n^{GQ}$ take different values.

(93) **Lemma 2:** $BCP_{m,n}^{SF} \neq BCP_m^{GQ} \circ BCP_n^{GQ}$

PROOF: Let $R \in \mathcal{P}(E \times E)$ such that $\mid Dom(R) \mid = \mid Ran(R) \mid > m, n$. Furthermore, let R be a bijection.
Since $\mid Dom(R) \mid = \mid Ran(R) \mid > m, n$, $BCP_{m,n}^{SF}(R) = 1$. But, since R is a bijection, every element in its range is related to only one element in the domain by R. By assumption, $n > 1$, so $BCP_n^{GQ}(R) = \emptyset$. Since BCP_m^{GQ} is positive, $BCP_m^{GQ} \circ BCP_n^{GQ}(R) = 0$. $\square$

The proof of **Theorem 1** (91) follows immediately from **Lemma 1** (92), **Lemma 2** (93), and Keenan's **Reducibility Equivalence** (87). $\square$

Appendix 2: The Reducibility of BCP^{QF}

In this section, I show that, for all values of its one contextual parameter, BCP^{QF} is reducible. In particular, I show that BCP_s^{QF} is equivalent to first existentially closing the event argument, and then applying BCP^{GQ}.

In order to complete the proof, we need an appropriate definition of the binary extension of the existential quantifier. As a type $< 1 >$ quantifier, $\exists$ is usually given a definition similar to (94)

(94) For all $P \in \mathcal{P}(E), \exists(P) = 1$ iff $P \neq \emptyset$

[15] A quantifier F is *positive* iff $F(\emptyset) = 0$.

(94) can be extended to binary relations in a number of ways. Firstly, we can extend it in the same way in which we extended BCP^1 to BCP^{GQ}, namely, we can take the *accusative extension.*

(95) **Accusative Extension** (Keenan (1987: 3)):
For F basic, F^{ACC} or the *accusative case extension* of F is that extension of F which sends each binary relation R to $\{b : F(bR) = 1\}$. ($bR =_{def} \{a :< b, a >\in R\}$)

The function given as BCP^{GQ} in the previous chapter is simply a generalization of (95) to n-ary relations. So the accusative extension of $\exists$ is (96).

(96) For all $R \in \mathcal{P}(E \times E)$, $\exists^{ACC}(R) = \{b : bR \neq \emptyset\}$

However, there is another obvious way in which we can extend $\exists$; that is, instead of looking at what $\exists$ does to the second co-ordinate of a relation, we can look at what it does to the first co-ordinte. This is the *nominative extension* of $\exists$.

(97) **Nominative Extension** (Keenan (1987: 4)):
For F basic, F^{NOM} or the *nominative case extension* of F is that extension of F which sends each binary relation R to $\{b : F(Rb) = 1\}$. ($Rb =_{def} \{a :< a, b >\in R\}$)

I now show that BCP^{QF} is equivalent to the case where *beaucoup* 'out-scopes' the existential quantifier. In other words, I show that BCP^{QF} is the same function as $BCP^1 \circ \exists^{NOM}$. This is stated as *Theorem 2* in (98).

(98) **Theorem 2:** For all $s \in \mathbb{N}$, $BCP^{QF}_s = BCP^1_s \circ \exists^{NOM}$
PROOF: Let $t \in \mathbb{N}$ to show $BCP^{QF}_t = BCP^1_t \circ \exists^{NOM}$. Let $R \in \mathcal{P}(E \times E)$ to show that $BCP^{QF}_t(R) = BCP^{GQ}_t \circ \exists^{NOM}$.
Case 1: $BCP^{QF}_t(R) = 1$. Then $BCP^{GQ}_t(Ran(R)) = 1$. Therefore, $R \neq \emptyset$. That means that for all $x \in Ran(R)$, there is some $e \in Dom(R)$ such that $< e, x >\in R$. Therefore, $E^{NOM}(R) = Ran(R)$. Since BCP^{GQ}_t applied to a property is BCP^1_t, $BCP^1_t(Ran(R)) = 1$, $BCP^1_t \circ \exists^{NOM}(R) = 1$. $\square$
Case 2: $BCP^{QF}_t(R) = 0$. Therefore, $BCP^{GQ}_t(Ran(R)) = 0$. Since $\exists^{NOM}(R)$ is simply $Ran(R)$, and $BCP^1_t(Ran(R)) = 0$, $BCP^1_t \circ \exists^{NOM}(R) = 0$. $\square$

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