Summing Quantities of Objects at the Left Edge

並列句賓語合成意之句法表達

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SUMMING QUANTITIES OF OBJECTS AT THE LEFT EDGE*

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ABSTRACT

This paper analyzes the syntactic structure of the construction represented by *How many books did Ken borrow and Kim steal in total*?, in which the semantics of the left-edge nominal (e.g., *how many books*) is cumulatively "shared" by the objects of the two clausal conjuncts. While efforts have been made to analyze the semantics of the construction in the literature, the syntax of the construction has been understudied and been considered a challenge to generative grammar. Extending Chaves's (2012 'Conjunction, cumulation and respectively readings', *Journal of Linguistics* 48:297-344) analysis for a subject-sharing construction, I propose a predicate-formation analysis for the construction. While providing a possible syntactic derivation for the construction, this research also probes the properties of the specific type of A-bar movement involved in the formation of a predicate.

Keywords: sharing, coordination, quantity, cumulative, add, predicate abstraction

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Niina Ning Zhang

1. THE ISSUE

This paper investigates a construction illustrated in the examples in (1) (more such examples are seen in Abbott 1976:642; Gawron & Kehler 2004; Chaves 2012, among others):

(1) a. [How many books]$_{j+k}$ did Ken borrow _$_j$ and Kim steal _$_k$ in total? (WH)
b. How many things did Ken eat _ and Kim drink _? (WH)
c. A total of 10 books have been bought _$_j$ by Ken and stolen _$_j$ by Kim. (raising)
d. I bought travel guides for Paris and London yesterday. Those two cities, Ken vacationed in _$_j$ and Kim decided to live in _$_k$, respectively. (topic)
e. I finally met Susan, Lyn, and Mary yesterday. They are the three sisters that Bob married _, John is engaged to _, and Bill is dating _, respectively. (relative)
f. It was a total of $3000 that I borrowed _ and my sister stole _ from the bank. (cleft)

In these examples, the underlined nominal denotes the sum of the two quantities or individuals that are related to the two object gaps in the two clausal conjuncts. For instance, in (1c), regardless of how many books Ken bought and how many books Kim stole, the total number of the books is 10. I call the construction Object-Summing Construction (OSC), and call the summing-denoting nominal in the construction, which is underlined in (1), Left-Summing DP (LS-DP).[1]

[1] OSCs are also observed in Right-Node-Raising (RNR) constructions such as (i), where the shared nominal occurs to the right-edge of the construction.
(i) I borrowed, and my sister stole, a total of $3000 from the bank.
RNR constructions are systematically different from their left counterparts (e.g., Abels 2004; Larson 2012) (e.g., the right-edge constraint on gap positions is seen in the former but not in the latter) (Ross 1967; Wilder 1997; Sabbagh 2007; among others). I therefore do not assume that the leftward dependency and the rightward dependency can be derived in a unified way. In this paper, I discuss only the OSCs in which the shared nominal is to the left of the coordinate complex.

In an OSC, there are at least two strings connected by a conjunction, but neither of them is a syntactic constituent in its surface form. For instance, neither *Ken borrow* nor *Kim steal* is a constituent in (1a). Moreover, the two gaps in the conjuncts are in dependency with the LS-DP only when they are semantically combined. Some work has been done on the analysis of the semantics of the construction (e.g., Landman 2000; Moltmann 2004; Gawron & Kehler 2002, 2003, 2004; Chaves 2012). But how is the construction derived in syntax? The syntactic challenge has been noted since Abbott (1976:642) and Postal (1998:137). Gawron & Kehler (2004:193) state that the construction is "problematic for any syntactic theory of long-distance dependencies that imposes an identity condition on gaps and their fillers, since such a relation does not exist here."

OSCs can also be found in Mandarin Chinese. One example is (2). Chinese OSCs pose the same syntactic question and thus challenge as the English ones do. I will discuss English examples only. The basic syntactic derivation proposed in this paper is applicable to other languages, including Chinese.

(2) Na 50 ben shu shi Lili zai shu-dian mai de haiyou Mimi cong
DEM 50 CL book be Lili at book-store buy DE and Mimi from
tushuguan jielai de.
library borrow DE
'The 50 books are the ones that Lili bought from a bookstore and Mimi borrowed from a library.'

In this paper, I apply the predicate abstraction theory of relatives (e.g., Heim & Kratzer 1998) to the syntax of OSCs, claiming that the LS-DP is the subject of a coordinate predicate, and that its conjuncts are both derived predicates.

The paper is organized as follows. In Section 2, I introduce certain basic syntactic properties of OSCs; and in Section 3, I rule out a number of unlikely analyses of the constructions. I make my proposal in Section 4. I then provide arguments for my proposal in Section 5. In Section 6, I further explore the characteristics of the type of the movement in my analysis. Section 7 discusses reconstruction effects in OSCs, showing

that the effects further support my analysis. The paper concludes in Section 8.

2. SOME PROPERTIES OF OSCS

2.1 Cumulative Object-Sharing

Semantically, there is a superset-subset relation between the LS-DP and each gap in an OSC. This property distinguishes this construction from other constructions.

First, if the reading of each gap is the same as that of the filler (i.e., the filler = each gap), we get an Across-The-Board dependency (ATB) construction, as in (3), rather than an OSC. In (3), the reading of the gap after *helped* is the same as that of the surface subject *the man*, and similarly, the reading of the gap after *ruined* is the same as that of the surface subject.

(3) The (same) man Mary helped _ and Jane ruined _.

The filler-gap identity reading of ATB constructions is confirmed by the parallel semantic anomalousness of (4a) (Heycock & Zamparelli 2000:351) and the *same*-construction (4b). The oddness of both (4a) and (4b) is accounted for by the common sense that the same documents cannot be written today after having been filed yesterday (See Zhang 2009 and 2010: Ch. 8 for a syntactic analysis of (3)). However, in the presence of the word *respectively*, the OSC in (5) is perfect. It is normal for people to talk about different documents, the one(s) that John wrote today and the one(s) that Mary filed yesterday.

(4) a. #Tell me which documents John wrote today and Mary filed yesterday.
b. #The same documents, John wrote today and Mary filed yesterday.

(5) Tell me, which documents John wrote today and Mary filed yesterday, respectively. OSC

Second, if the reading of a gap ranges over the reading of a filler, but not the other way around (i.e., each filler < the gap), a split control construction such as (6a), or a partial control construction such as (6b), instead of an OSC, emerges.

(6) a. John$_i$ persuaded Mary$_k$ [PRO$_{i+k}$ to leave together]. (split control)
b. The chair$_i$ would prefer [PRO$_{i+}$ to gather at 6]. (partial control)

The semantic relation between a filler and a gap in such constructions is the opposite to the one found in an OSC. An imagined control construction in which the reading of a filler ranges over the reading of a gap (i.e., the filler > each gap), as in (7), is not acceptable.

(7) *Those guys$_{i+}$ managed [PRO$_i$ to become the first president of the university].

2.2 Obligatory Gaps

OSCs are different from another split-dependency construction such as (8), since their gaps may not be filled by pronouns. If the gap positions of an OSC are filled by pronouns, as seen in (9), the sentence becomes unacceptable.

(8) The couple came in. She was black and he was blond. (No gaps)
(9) *How many books$_{j+k}$ did Ken borrow them$_j$ and Kim steal them$_k$ in total? (No gaps)

2.3 The Obligatory Occurrence of the Shared Nominal

OSCs are different from implicit argument constructions such as (10), in that the occurrence of the LS-DP is obligatory. In (10), the external argument of the transitive verb *spotted* is implicit. In other words, one of the arguments of the transitive verb is not associated with any nominal (see Landau 2010, among others). However, if we remove the LS-DP *those two cities* from (11a), the gaps will no longer be associated with any nominal. As seen in (11b), the sentence becomes unacceptable.

(10) The shark was spotted at once (by our cameras).
(11) a. Those two cities, Ken vacationed in _j and Kim decided to live in _k, respectively.
b. *Ken vacationed in _j and Kim decided to live in _k, respectively.

2.4 Locality

Long-distance dependency between the LS-DP and the two gaps is possible, as seen in (12). In this example, the LS-DP *how many books* is related to the objects of the two embedded verbs, *borrowed* and *stole*, rather than **to** the matrix verb *think*.

(12) How many books do you think Ken borrowed _j and Kim stole _k in total?

However, the gaps in an OSC may not occur in an island. In (13a), the second gap is in the temporal adverbial clause, an adjunct island. In (13b), both gaps are in relative clauses, which are Complex NP islands. Neither sentence is acceptable.

(13) a. *How much money$_{j+k}$ did Mary steal _j and you got rich after you borrowed_ k, in total?
b. *How many books did the man [who borrowed _] came and he woman [who stole _] left in total?

2.5 Anti-C-Command Relation Between the Gaps

In an OSC, one gap may not c-command the other gap. If a speaker intends to ask the total number of the people that is the theme of the asking and the theme of hiring, he or she will not use the unacceptable form in (14).

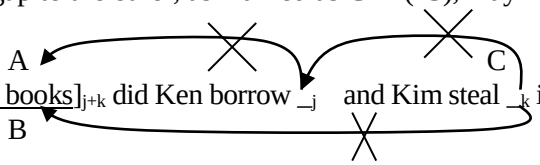
(14) *How many people$_{j+k}$ did John ask _j to hire _ k in total?

3. THE APPROACHES THAT ARE NOT APPLICABLE TO OSCS

In this section, I rule out certain unlikely analyses of OSCs, based on the properties of the constructions reported in the previous section.[2]

3.1 Phrasal Movement From a Gap to the LS-DP

It is unlikely that there is a phrasal movement relation between a gap and the LS-DP in an OSC. As is known**,** a movement chain has an identity condition which requires that the semantics of the footprint and that of the surface form are identical. We have seen in 2.1 that the LS-DP has a different reading from that of either gap. Thus neither the movement step A nor the movement step B, marked on (15), is possible. Also, since the two gaps of an OSC do not have to refer to the same entity (esp. (1d, e)), a sideward movement (e.g., Hornstein & Nunes 2002) from one gap to the other, as marked as C in (15), may not apply.



(15) [How many books]$_{j+k}$ did Ken borrow $\__j$ and Kim steal $\__k$ in total?

3.2 Direct Deletion

Deletion has a recoverability condition (Chomsky 1965:144). The lack of an identity between the LS-DP and the gaps (the property described in 2.1) also rules out a deletion analysis of OSCs. For instance, it is impossible to derive (16a) from (16b).

[2] I do not consider a multi-dominance analysis of OSCs. If the construction can be derived by way of a regular well-recognized syntactic mechanism, as to be shown in this paper, it is not necessary to stipulate a new mechanism (see Stark 2012 for a discussion of the theoretical and empirical disadvantages of the multi-dominance theory).

(16) a. I bought travel guides for Paris and London yesterday. Those two cities, Ken vacationed in $_j$ and Kim decided to live in $_k$, respectively. (= (1d))

b. *Those two cities, Ken vacationed in ~~those two cities~~ and Kim decided to live in ~~those~~ ~~two cities~~, respectively.

3.3 Cumulative Subjects

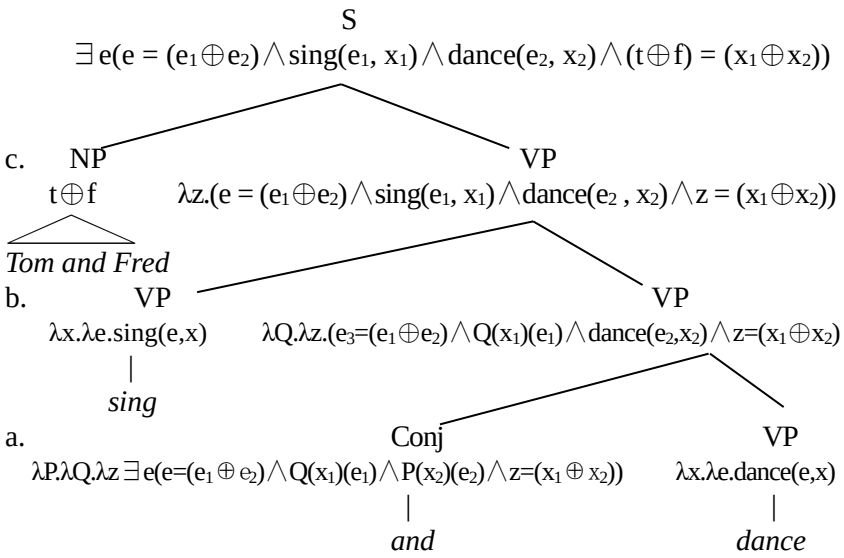
A third inapplicable analysis of OSCs is an analysis proposed for subject-sharing constructions, such as (17).

(17) Tom and Fred sang and danced.
A. Respective reading
B. Non-respective reading

This example has two readings. In reading A, the sentence means Tom sang and Fred danced, and in reading B, at least one of them did the two activities, singing and dancing. In a development of the semantic theory proposed by Link (1983), Chaves (2012:309) claims that predication dependencies shared by conjuncts are combined via a sum relation $\oplus$, which covers both readings of (17). In other words, the respective reading (i.e., reading A) is just one of the possible readings of a coordinate construction, and a coordinate construction itself, in the absence of an adverb such as *respectively*, *together*, or *in total*, or any pragmatic conditions, does not distinguish different possible readings.

To derive (17), Chaves (2012:312) proposes the following three steps of derivation, marked as a, b, and c in the tree in (18) (= his (31)), and the correlated semantic structures below the tree.

(18) [$_S$ [$_{NP}$*Tom and Fred*] [$_{VP}$*sang and danced*]]



a. $(\lambda P.\lambda Q.\lambda z.\ \exists e(e = (e_1 \oplus e_2) \wedge Q(x_1)(e_1) \wedge P(x_2)(e_2) \wedge z = (x_1 \oplus x_2)))$
$(\lambda x.\lambda e.\text{dance}(e, x))$
$\vdash\!\!\rightarrow_\beta \lambda Q.\lambda z.(e_3 = (e_1 \oplus e_2) \wedge Q(x_1)(e_1) \wedge \text{dance}(e_2, x_2) \wedge z = (x_1 \oplus x_2)$

b. $(\lambda Q.\lambda z.\ \exists e(e = (e_1 \oplus e_2) \wedge Q(x_1)(e_1) \wedge \text{dance}(e_2, x_2) \wedge \exists z(z = (x_1 \oplus x_2)))$
$(\lambda x.\lambda e.\text{sing}(e, x))$
$\vdash\!\!\rightarrow_\beta \lambda z.(e = (e_1 \oplus e_2) \wedge \text{sing}(e_1, x_1) \wedge \text{dance}(e_2 , x_2) \wedge z = (x_1 \oplus x_2))$

c. $(\lambda z.\ \exists e(e = (e_1 \oplus e_2) \wedge \text{sing}(e_1, x_1) \wedge \text{dance}(e_2, x_2) \wedge z = (x_1 \oplus x_2)))$
$(t \oplus f)$
$\vdash\!\!\rightarrow_\beta \ \exists e(e = (e_1 \oplus e_2) \wedge \text{sing}(e_1, x_1) \wedge \text{dance}(e_2, x_2) \wedge (t \oplus f) = (x_1 \oplus x_2))$

According to Chaves (2012:312), "In (31a) [= (18) in this paper – *NZ*] we combine *and* with *danced*. In (31b) we combine *sang* with *and danced*. Note that a sum is formed with the denotation of the conjuncts, and the shared subject dependent is combined via '⊕'. Finally, in (31c) we combine *Tom and Fred* with *sang and danced*."

Chaves's analysis has three important points, summarized in (19):

(19) First, Reading A and Reading B of (17) are both covered by the semantics of t⊕f (e.g., Scha 1981:497; Link 1991; Krifka 1989; Landman 2000; Beck & Sauerland 2000);
Second, a single event reading and a two-event reading of the coordinate construction are both covered by $e_1 \oplus e_2$;
Third, whether adverbs such as *respectively* may occur depends on pragmatics; and if *respectively* occurs, its linearization-based ranking of the reading is decided by processing easiness, and thus there is no distributive or cumulative operator in the syntactic structure (see Chaves 2012 for details).

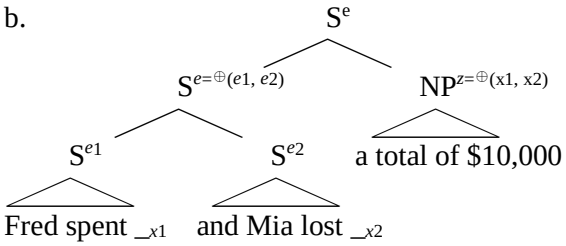
We can see that in this analysis, the two predicates are combined before the integration of the shared nominal.

Note that if we use this analysis for OSCs, there is a timing problem. (1a) is repeated here as (20):

(20) [How many books]$_{j+k}$ did Ken borrow _$_j$ and Kim steal _$_k$ in total? (= (1a))

Unlike *dance* in (17), the string *Kim steal* in (20) is not a constituent. Therefore, the string may not combine with *and* directly. Chaves (2012:318-319) mentions OSCs, and on p. 339, he presents the tree diagram in (21b) for the RNR version of the OSC in (21a), but he does not specify how the two gaps, *x*1 and *x*2, in the clausal conjuncts are related to the NP syntactically.

(21) a. Fred spent and Mia lost a total of $10,000.
b.



We thus conclude that at least the first step in (18a) does not apply to OSCs.

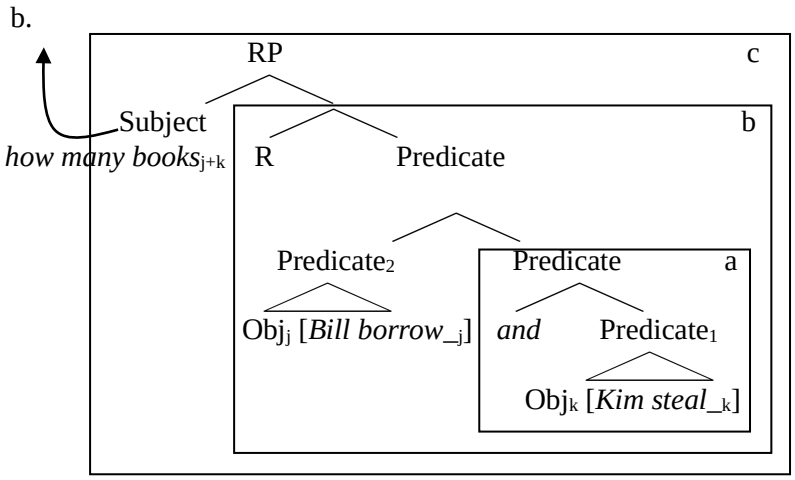
However, Chaves's (2012) theory of predicate conjunction of the construction can be revised and extended to OSCs, as will be elaborated in the next section.

4. MY PROPOSAL: UNSATURATION OF PROPOSITIONS

I claim that Chaves's derivation step (18c) is applicable to OSCs. In order to attain the result of his step b (or the input for step c), we need to change each of the clausal conjuncts of an OSC into a predicate. This is illustrated in (22) (= (1a)) (Obj means silent object).

(22) a. [How many books]$_{j+k}$ did Bill borrow _$_j$ and Kim steal _$_k$ in total?

b.



This derivation contains three merging steps similar to those in (18), and the contents in (19) apply here. Specifically, the LS-DP of the OSC is the subject of the conjoined derived predicate, and thus the semantics of the plurality of the LS-DP, j⊕k, covers the cumulative reading of OSCs (the property reported in 2.1). This LS-DP is base-generated

externally to the coordinate complex. This is similar to step c in (18). No element moves out of either conjunct (cf. 3.1).

The LS-DP may undergo movement (A- and/or A-bar movement). For instance, in order to derive (12), the LS-DP *how many books* moves to the C-domain of the matrix clause. Also, cleft constructions such as (1f) can be derived by whatever operations necessary for the building of a cleft construction in which the LS-DP is focused.

This derivation is different from (18) in the syntactic operations in forming each conjunct. Specifically, there are two important steps in the local working site of each conjunct:

Step 1: The formal properties of the verbs or prepositions (selection, theta-roles) are satisfied by the Objs. Therefore, the timing problem mentioned above does not occur.

Step 2: The Obj moves to the left edge of the clause, creating a new predicate.

The proposed analysis is justified in the following aspects.

The presence of the Obj in the gap of each conjunct in (22) is required by the transitive verb/prep in the conjunct. According to the Projection Principle (Chomsky 1981), in the presence of the agent, a transitive verb must have an object. The verb and the object need to have formal feature relations (selection, theta-role, Case, and so on).

The Coordinate Structure Constraint (CSC, Ross 1967) is not of concern here, since the movement of each Obj is inside the conjunct.

The movement of the Obj in each conjunct does not land in any theta-position. This follows the well-established rule that no element may moves to a theta-position.

This kind of A-bar movement is seen in relativization. For instance, in order to derive the relative clause construction in (23), the relative pronoun *which*, which is the object of the verb *abandoned* and the semantics of which is decided by the antecedent *house*, undergoes an A-bar movement (Predicate Abstraction) (e.g., Heim & Kratzer 1998), to the effect that the semantically saturated proposition is changed into a predicate.

(23) The house [which$_i$ John abandoned t_i] is available.

This kind of A-bar movement is also seen in Sæbø's (2009) analysis of various *have*-constructions and the *with*-small clause constructions in English and their counterparts in some other languages. The effect of the movement is to transform a small clause into a predicate.

The semantic effects of A-bar movement, such as predicate-formation, are discussed in Chomsky (2000 *et seq.*), Adger & Ramchand (2005:176), among others.

The essential idea of my proposal is that the apparent object-summing of OSCs can be analyzed as a subject-summing resulting from the coordination of two derived predicates, and, then, Chaves's syntactic and semantic analysis of subject-summing constructions can be applied.[3]

5. ARGUMENTS FOR THE MOVEMENT OF THE (NULL) OBJECT IN EACH CONJUNCT

The movement of the Obj in each conjunct of (22) is supported by the following four facts.

First, as we showed in 2.2, the two gaps in an OSC are each in their respective object positions and they are obligatory. The contrast in acceptability between (9) and (8) is explained: the gaps in the former are footprints of the movement of an OSC, whereas the latter is not an OSC and has no gaps.

Second, the positions of the object gaps in an OSC show island effects (2.4), and this fact is compatible with the movement analysis proposed here.

(24) a. *How much money did Mary steal and you got rich after you borrowed, in total? = (13)

[3] One anonymous reviewer states that an implicit assumption in the paper is that the quantity denoted by Obj_i and that by Obj_j are added, and the sum is exactly equivalent to the LS-DP. However, the reviewer comments that if Bill borrowed four books and a laptop, and Kim stole three books and two laptops, the combination of the two objects in (22) should mean a larger set than the referent of the LS-DP. I think that this issue is a general one, and not restricted to OSCs. For instance, the fact that I bought four books and a laptop does not falsify (i):

(i) I bought four books.

b. *How much money did Obj$_j$ Mary steal _$_j$ and Obj$_k$ you got rich [after you borrowed _$_k$], in total?

Third, the gaps in the conjuncts of an OSC license parasitic gaps. Parasitic gaps are licensed by the movement of certain elements, but not by in situ elements (Chomsky 1982). The example in (25a), for instance, is analyzed as in (25b).

(25) a. How many girls did Ken kiss and Kim hug in total, without knowing?
b. [How many girls]$_{j+k}$ did *Obj*$_j$ Ken kiss _$_j$ and *Obj*$_k$ Kim hug _$_k$ in total, without knowing *pg*?

Fourth, the gaps in the conjuncts of an OSC also show other effects of movement. In the non-OSC in (26a) (Dayal 2002:514), there are two wh-elements. In this multiple-wh question, only one wh element moves, i.e., the subject one. The other one, which is the object of *kissed*, remains in situ. In the OSC in (26b), there are also two wh-elements: one is *who*, which is the subject of *steal* in the second conjunct, and the other is the LS-DP *how many books*, which is partially related to the object of the same verb. In other words, the object of the verb is also a wh-question element, although it has no overt form.

(26) a. Who bought what?
b. *How many books did Ken borrow and who steal in total?
Intended: Ken borrowed some books and another person stole some books. How many books are involved in total and who was that person?

The unacceptability of the OSC in (26b) can be explained in our Obj movement analysis. In the second conjunct of this example, if *who* remains in situ and the Obj, which is a silent wh-element, moves alone, the ungrammaticality is covered by the Superiority Condition, which states that if element A asymmetrically c-commands element B, and, if one of them may move, it is A that should move (Chomsky 1973). Thus, in the embedded wh-constructions in (27a) and (27b), since the subject

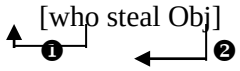
who c-commands the object *what*, *who*, instead of *what*, should move. (27a) satisfies the condition, but the unacceptable (27b) does not.

(27) a. (I wonder) who _ saw what.
b. *(I wonder) what who saw _.

The violating of the Superiority Condition in the second conjunct of (26b) is shown in (28), where *who* remains in situ, and the Obj, which is also a wh-element, moves alone.

(28) *Obj$_k$ [who steal _$_k$]

However, in the second conjunct of (26b), is it possible that *who* moves first, and then the Obj moves (at LF), as shown in (29)?

(29) 

According to Dayal (2002:517), in English, "wh-in-situ is interpreted either in its S-Structure position via choice functions or as an operator binding a functional trace at LF. The first option leads to single-pair answers, the second to multiple-pair answers." Thus, (30a) may have a single-pair reading, allowing an answer such as (30b), or a pair-list reading, allowing an answer such as (30c), and in the latter case, the question in (30a) is derived by the overt movement of *who* and then the covert movement of *what* (also see Cheng & Demirdache 2010).

(30) a. Who bought what?
b. Sybren bought a plane.
c. Sybren bought a plane, Amina bought a train and Zara bought a bicycle.

With this background, we can see that the derivation in (29) would be possible if the question in (31a) admitted of a pair-list reading, and thus allowed an answer such as (31b).

(31) a. Who stole how many books?
b. #Jim stole three books and Kim stole five.

The fact is that my informant, who accepts the dialogues in (30), responded that (31b), as an answer to (31a), "sounds stupid" instead. The contrast between (30) and (31) may correlate with the asymmetry between referential and non-referential wh-phrases (Rizzi 1990; Heycock 1995). In (29), the Obj is a silent form, with the interpretation of *how many books*, which is not referential, similar to that of the object in (31a). Thus, even if we change the subject in (26b) from *who* to *which man*, as suggested by an anonymous reviewer, the form is still not acceptable, as seen in (32) (confirmed by my informant), since the problem of the object movement remains.

(32) *How many books did Ken borrow and which man steal in total?
Intended: Ken borrowed some books and another person stole some books. How many books are involved in total and who was that person?

All of these four facts above support the conjunct-internal movement of the object in the syntax of an OSC.

6. EXPLORING PREDICATE-FORMING MOVEMENT

In my analysis of OSCs proposed here, I made use of the A-bar movement that has the effect of forming a derived predicate. In this section, I explore two characteristics of this kind of syntactic operation.

First, the domains of this kind of movement can vary. In OSCs, the domain of the movement is the range of the conjunct, and the conjunct can be a theta-domain (vP), as in (1a, b, c); or a finite IP or CP, as in (1d, e, f). It can also be an infinitive IP, as in (33a), and a domain higher than a CP, as in (33b) (also, Sæbø 2009 discusses the predicate-forming movement that applies to small clauses).

(33) a. How many books did John expect you to borrow and me to steal, in total?

b. How many books did John think that Ken borrowed and Bill think that Kim steal in total?

Adger & Ramchand (2005:173) present a semantic analysis of A-bar dependencies, using two features. One is [Λ], which is a lambda operator, and appears at the left edge of the clause and turns its propositional meaning into a predicate. The other is [ID], which marks the variable. They claim that given these features, there only needs to be a simple correspondence at the interface that allows a syntactic object of the following type to be interpreted as an instance of predicate abstraction. The left hand side of (34) presents the expression in syntax and the right hand side its LF interpretation.

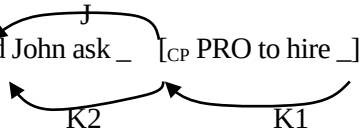
(34) [Λ ... ID] -> λx ... x

The variation in the movement domain indicates that if the feature [Λ] or [+Pred] (Rizzi 1990:67, for C only) exists, it is not category-specific. It can occur in any proposition-denoting head, to derive a new predicate.

Second, there may not be multiple unsaturating operations for the same proposition. Consider (35).

(35) a. *How many people$_{j+k}$ did John ask _$_j$ to hire _$_k$ in total? (= (14))

b. *[how many people] did John ask _ [$_{CP}$ PRO to hire _] in total?



In (35a), as illustrated in (35b), when the Obj of *hire* moves to the edge of the lowest CP (Step K1), the CP becomes a predicate, and, if it does not move further, in the absence of any antecedent to saturate the predicate, it remains as a predicate, and thus may not be selected by *ask*. But if the object moves further (Step K2), this movement and the movement of the indirect object of *ask* (Step J) will both desaturate the same proposition. If the Obj of *hire* moves directly to the edge of the matrix clause (i.e., K1 and K2 are combined into one movement step),

the same unacceptable form is derived. The unacceptability can arise from the multiple desaturating operations for the same proposition. This hypothesis is confirmed by a similar situation occurring in relative clause constructions. In multiple relative pronoun constructions in English, each one desaturates a different proposition, as seen in (36a). *Who* desaturates the clause that is projected from *kissed*, and *whom* desaturates the clause that is projected from *met*. In (36b), both *who* and *whom* move from the same clause. The multiple desaturating operations for the same proposition in (36b) are not possible. One cannot relativize the external and the internal argument of the same verb.

(36) a. [The boy$_b$ [whom$_b$ a girl$_g$ [who$_g$ __$_g$ has kissed a doll] has met __$_b$]] has come.
b. *[The boy$_b$ [whom$_b$ a girl$_g$ [who$_g$ __$_g$ has kissed __$_b$]]] has come.

The predicate-forming movement is thus different from a question-forming movement. In Slavic languages, multiple wh-fronting in questions can be launched from the same clause, as seen in (37):

(37) Koj kogo vižda? [Bulgarian; Rudin 1988:449]
who whom sees
'Who sees whom?'

7. RECONSTRUCTION EFFECTS

What is the relation between the LS-DP and the fronted null Obj in each conjunct? Do the two null Objs behave like null pronouns, as labeled in (38)?

(38) [How many books]$_{j+k}$ did *pro*$_j$ Ken borrow _$_j$ and *pro*$_k$ Kim steal _$_k$ in total?

It seems that the null pronoun analysis is not plausible, for two reasons. First, the assumed null pronouns have no antecedent (cf. the property in 2.1), and thus the [ID] feature of the pronoun (Adger &

Ramchand 2005) may not be valued/licensed, and, as a consequence, OSCs should be ill-formed. However, the acceptability of OSCs does not support the null pronoun analysis.

Second, reconstruction effects occur between the LS-DP and the gaps, indicating that the elements correlating to the gaps have richer structures than those of pronouns. One reconstruction effect concerns the binding Condition C, which states that a referential nominal may not be c-commanded by a co-referential nominal. In the unacceptable (39a), *John* is contained in the LS-DP *how many pictures of John*, and the subject in the first conjunct is *he*, co-referential with *John*. If this proper name occurs originally within the gap of the first conjunct, as illustrated in (39b), we can see a violation of Condition C (the position marked by < > is the base-position of the moved Obj). The violation explains the unacceptability of the sentence.

(39) a. *How many pictures of John$_i$ did he$_i$ post _ on Facebook and Mary post _ on her blog in total?

b. *[$_{\text{LS-DP}}$How many pictures of John$_i$] did [$_{\text{Obj}}$ ... John ...]
he$_i$ post <... *John$_i$ ...> on Facebook and ... in total?
|_____|

Another reconstruction effect is related to the binding Condition A, which states that a variable pronoun must be bound by a clause-internal c-commanding nominal. In (40a), *his* in the LS-DP *how many pictures of his mother* is semantically bound by the quantifier *every*, but the latter does not c-command the former. If *his* occurs originally within the gap of a conjunct, as illustrated in (40b), the binding is legal, and the acceptability of the sentence is accounted for. This analysis also applies to the variable-binding relation in the second conjunct of (40a).

(40) a. How many pictures of his$_i$ mother did every painter$_i$ paint _ and every cartoonist sketch _ in total?

b. [$_{\text{LS-DP}}$How many pictures of his$_i$ mother] did [$_{\text{Obj}}$ ... his ...]
every painter$_i$ paint <...his$_i$...> and ... in total?
|_____|

The two reconstruction effects suggest that a certain part of the LS-DP of an OSC is base-generated in the object position of each conjunct. One theory that is able to account for this fact is the deletion under the identity account for relative clause constructions (Lee 1961; Munn 1994; Citko 2001; Sauerland 2003, among others). I claim that in each conjunct of an OSC, the Obj has a null quantifier, labeled as Quant in (41), and a full copy of the non-quantifier part of the LS-DP. In (41), the part that is crossed out is deleted at PF, and the shaded part does not occur at LF.

(41) How many pictures of his mother did
[Quant ~~pictures of his mother~~] every painter paint <~~Quant pictures of his mother~~> and
[Quant ~~pictures of his mother~~] every cartoonist sketch <~~Quant pictures of his mother~~> in total?

In each conjunct of (41), after the whole Obj moves to the edge of the conjunct, [*pictures of his mother*] is deleted at PF (the form can be recovered from the LS-DP). Except for *his*, the fronted Obj remains at LF, so that the original clause becomes desaturated, i.e., becomes a derived predicate. In the fronted Obj, the pronoun *his* has undergone reconstruction back to the base-position of the Obj, and is bound by *every* at LF.

In this analysis, one can see that the quantifier in the Obj of each conjunct is never overt. The content of the null quantifiers can be recovered from the context, as in (42a), or underspecified, as in (42b). In (42a), since the numeral in the LS-DP is *two*, the plausible reading of the null numeral in the Obj of each conjunct must be that of *one*.

(42) a. I bought travel guides for Paris and London yesterday. Those two cities, Ken vacationed in $\__j$ and Kim decided to live in $\__k$, respectively. (= (1d))
b. A total of 10 books have been bought $\__j$ by Ken and stolen $\__j$ by Kim. (= (1c))

8. CONCLUSIONS

In an OSC, the summing of the meanings of the objects of two verbs is expressed by a DP at the left-edge, the object gaps may not be in an island, and one gap may not c-command the other gap. I have shown that OSCs cannot be derived by a phrasal movement from a gap position to the LS-DP, or by any direct deletion of the objects of the verbs, or by the coordination of any non-syntactic constituents. In my analysis proposed here, the formation of an OSC includes (i) the flexibility in the reading of a plural subject; (ii) the A-bar movement that creates a predicate from a clause, as seen in relative clause constructions; and (iii) deletion under identity at PF.

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並列句賓語合成意之句法表達

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為了分析 *How many books did Ken borrow and Kim steal in total*? 這類並列句賓語合成句型的句法生成，本文一方面運用了用以生成派生謂語的移位理論，另一方面發展了 Chaves 2012 年在 *Journal of Linguistics* 上所提出的關於並列句主語合成句型的理論。另外，文中也探討了用以構建派生謂語的移位的一些特點。

關鍵字：合成意、並列、數量、派生謂語