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Volume 117, Issue 12, December 2007

ISSN 0024-3841

Lingua

International Review of General Linguistics

Lingua Table of Contents delivered free to your desktop: Register for ScienceDirect Alerts

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The syntactic derivations of two paired dependency constructions

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Received 7 December 2005; received in revised form 17 February 2007; accepted 18 February 2007

Available online 17 May 2007

Abstract

In this paper, I present a sideward movement approach to the syntactic derivations of Conjoined Question Words Constructions, such as *What and when does John normally eat?* and Interwoven Dependency Constructions, such as *Which nurse and which hostess did Fred date and Bob marry respectively?* Both constructions exhibit dependencies between one coordinate complex and two syntactic gaps, with each conjunct of the complex associated with one of the gaps. I argue for a paired movement analysis for these constructions. I propose that the two conjuncts of the left coordinate complex in both constructions first undergo sideward movement from the gap positions independently, and form a coordinate complex with a conjunction, and later the newly built coordinate complex is integrated into the (complex) clause. This analysis shows how the landing site freedom gained from sideward movement makes the syntactic derivations of the two paired dependency constructions possible, while avoiding problems of alternative approaches.

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Keywords: Sideward movement; WH word; Coordination; Conjunct; Respectively; Gap

1. Introduction

This paper studies the syntactic derivations of two constructions which exhibit dependencies between one coordinate complex and two syntactic gaps, with each conjunct of the complex associated with one of the gaps, respectively. The two constructions are shown in (1a) and (1b).

- (1) a. [What_i and when_j]_k does John normally eat _{-i} _{-j}?
 b. [[Which nurse]_i and [which hostess]_j]_k did Fred date _{-i} and Bob marry _{-j}, respectively?

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The construction in (1a) is called Conjoined Question Words Construction (CQWC) (Browne, 1972), and the one in (1b) is called Interwoven Dependency Construction (IDC) (Postal, 1998). In both constructions, conjunct_i and conjunct_j in the coordinate complex_k are associated respectively with gap_i and gap_j.

Descriptively, these two constructions are different in at least two aspects. First, in CQWCs, the two conjuncts of the coordinate complex_k may correspond to two different types of syntactic positions. In (1a), *what* is related to the object and *when* is related to the adjunct of the clause. In IDCs, however, the two conjuncts of the coordinate complex_k may not correspond to two different types of syntactic positions. In (1b), *which nurse* is related to an object and so is *which hostess*. Second, the two gaps in CQWCs do not occur in two conjuncts, whereas those of IDCs do.

Despite these differences, I claim that both constructions are derived by sideward movement. My analysis shows how the landing site freedom gained from sideward movement makes the syntactic derivations of the two paired dependency constructions possible, while avoiding the problems of alternative approaches. This effort responds to the challenges that these constructions have been claimed to pose to generative syntax (see Postal, 1998).

I analyze CQWCs and IDCs in sections 2 and 3, respectively. I introduce CQWC data in section 2.1, argue against three analyses in section 2.2, and propose my own sideward movement analysis of the constructions in section 2.3. In addition, I address the issue of the parallelism requirement on conjuncts in section 2.4. In section 3, I first introduce IDC data in section 3.1, make certain clarifications in section 3.2, argue for a movement approach to IDCs in section 3.3, and present my sideward movement analysis of IDCs in section 3.4. In section 3.5, I discuss the agreement issue of IDCs. Section 4 concludes the paper.

2. Conjoined question words construction

2.1. WH conjuncts of unlike functions

In this section, I present examples of CQWCs, in which a WH argument and another WH element are conjoined in a single clause. The constructions are observed not only in English (for a rich collection, see Whitman, 2002), but also in multiple WH movement languages such as Russian, Serbo-Croatian, and Czech, and WH in situ languages such as Chinese:

- (2) a. What and when does John (normally) eat? (Grosu, 1985:232)
 b. How and what does John eat? (Whitman, 2004:404)
 c. I need to know where and what Emerson taught after graduating from Harvard. (Whitman, 2002:289)
 d. How does CM control when and whose transmissions occur? (Whitman, 2002:76)
 e. The Standards don't tell teachers how or what to teach. (Whitman, 2002:79)
- (3) a. Kto i kogo udaril? (Russian, Kazenin, 2001)
 who and whom hit
 'Who hit whom?'
 b. Ko i čime je razbio staklo? (Serbo-Croatian, Browne, 1972)
 who and with-what 3SG.AUX broke glass
 'Who and with what broke the glass?'

- c. Kdo a kdy napsal tu knihu? (Czech, Browne, 1972)
 who and when wrote that book
 ‘Who and when wrote that book?’
- (4) a. Shui yiji cong nali tingshuo-le zhexie yaoyan? (Chinese)
 who and from where hear-PRF these rumor
 ‘Who and from where heard these rumors?’
- b. Shui yiji weishenme Wang Jiaoshou zuotian biao yang-le?
 who and why Wang Prof. yesterday praise-PRF
 ‘Whom and why did Prof. Wang praise yesterday?’
- c. Shui haiyou duoshao-qian ni dasuan yao juanxian?
 who and how.much-money you plan want donate
 ‘Whom and how much money do you plan to donate?’

In these data, the WH conjuncts have different syntactic functions. In (2), (3b,c), and (4), the argument and the adjunct are conjoined, and in (3a), the external argument and the internal argument are conjoined. Analogous non-WH elements cannot be conjoined so easily, as seen in (5b/c). The two unacceptable sentences are compared to the non-coordinate counterpart in (5d), which is acceptable.

- (5) a. When and where did you see John?
 b. *I saw John yesterday and in the park.
 c. *I saw John in the park and yesterday.
 d. I saw John in the park yesterday.

Similarly, in neither Russian nor Chinese, a nominal and a PP may be conjoined if they are not WH-phrases. Compare the following Russian example (6a) with (3b) above, and compare the following Chinese example (6b) with (4) above:

- (6) a. Ob etom slyšal Vasja (*i) ot Peti. (Russian, Kazenin, 2001:(8))
 about this heard Vasja (*and) from Peter
 ‘Vasja heard about this from Peter.’
- b. *Akiu yiji cong Beijing tingshuo-le zhexie yaoyan ma? (Chinese)
 Akiu and from Beijing hear-PRF these rumor Q
 Intended: ‘Did Akiu hear these rumors from Beijing?’

Kazenin (2001) also reports that unlike (3a), a non-WH agent and a non-WH patient cannot be conjoined in Russian. The general constraint that elements of conflicting theta roles cannot conjoin has been studied by Johannessen (1998). It seems that cross-linguistically, one licensing condition of such coordination of unlike conjuncts is that the conjuncts are WH elements and the conjuncts do not occur in their base-positions.¹

¹ In data like the following (Grosu, 1985:232), the two conjuncts must be both focused:

- (i) John writes only funny letters and only to funny people.

One might analyze such data in terms of VP coordination with Across-The-Board movement of V to v, as suggested by one reviewer. In this analysis, the focus requirement is explained by the parallelism of Across-The-Board constructions.

On the other hand, CQWCs are constrained in different ways in different languages. For instance, it has been noted that CQWCs must be clause-bound in languages such as English and Romanian (see Comorovski 1989 for Romanian, cited in Kazenin, 2001:14). I observe the same constraint on Chinese. In (7a), for instance, the first WH-conjunct *shui* ‘who’ functions as the external argument of the matrix clause, whereas the second WH-conjunct, *cong nali* ‘from where,’ functions as an element of the embedded clause. The unacceptability of (7a) can be compared with the acceptability of (4a). However, no such constraint is seen in Russian. In (7b), for instance, the first WH-conjunct *kto* ‘who’ functions as an argument of the matrix clause, whereas the second WH-conjunct, *čto* ‘what,’ functions as an argument of the embedded clause (Kazenin, 2001).

- (7) a. *Shui yiji cong nali yao wo mai na ben shu? (Chinese)
 who and from where want I buy that CL BOOK
 Intended: ‘Who wants me to buy the book and where does he want me to buy it from?’
 b. Kto_i čto_j _{-i} xočet, čtoby ja delal _{-j} (Russian)
 who and what wants COMP I did
 ‘Who wants me to do what?’

Moreover, within the same language, certain combinations are acceptable in one construction but not acceptable in another construction. For instance, Grimshaw (1978:(4b)) presents the following unacceptable English CQWC in (8a) (the example is cited in Gazdar 1981:174). However, (8b) and (8c) are found by a Google search (Both sentences have been judged as acceptable by my informant). They all have the coordinate complex *who and where*.

- (8) a. *John asked who and where Bill had seen.
 b. He saw Ruth’s picture and asked who and where that person was.
 c. Applications for both countries asked who and where we would be visiting.

Without a careful investigation of a specific language, I do not want to make stipulations on the constraints on CQWCs of the language. While leaving all of these issues of constraints or licensing conditions aside (see Kazenin, 2001, for discussion of such issues of Russian CQWCs), I focus on one basic question here, not yet solved in the literature: how are the WH-phrases of unlike syntactic functions merged together in the constructions. I now want to account for the possible derivations of the acceptable patterns that have been found cross-linguistically, leaving the explanations for the impossible patterns in specific languages for future studies.

2.2. Three problematic analyses

Where is the coordinate complex of CQWCs assembled? As I stated before, in data like (2), (3), and (4), the WH conjuncts have different syntactic functions. An argument conjoins with an

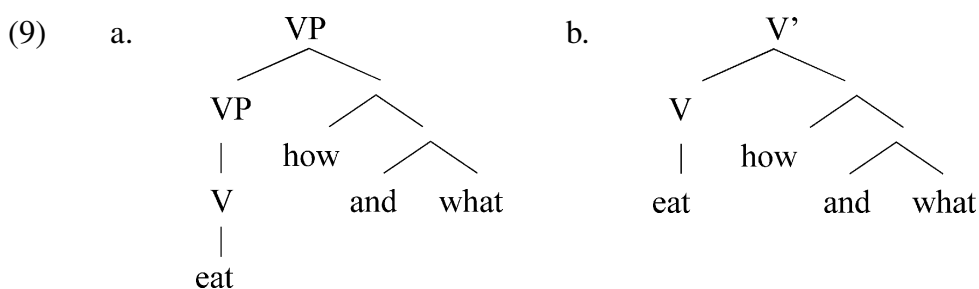
Alternatively, one might treat such data as Right Node Raising counterpart of CQWCs in which the question conjuncts are replaced by focus conjuncts. Then the constructions may be derived by operations for Right Node Raising constructions. It has been recognized that there are systematic syntactic differences between leftward dependency constructions and Right Node Raising constructions (e.g., the right-edge constraint on the gap positions is seen in the latter but not in the former) (Ross, 1967; Wilder, 1997; Sabbagh, in press; Bachrach and Katzir, 2006, among others). For this reason, I do not assume that the leftward dependency of CQWCs and the rightward dependency of (i) can be derived in a unified way. I leave the issue for future research.

adjunct in (2), (3b,c), and (4). Moreover, an external argument conjoins with an internal argument in (3a). Although it is true that the pattern of (3a) is not found in English and Chinese, we need to explain why the pattern can ever be derived by the computation system. Peterson (2004:650) states that conjuncts should be identical in grammatical functions (such as subject, object, adverbial, and predicate). If the conjuncts of a CQWC have different functions in the clause, how can they form a coordinate complex?

Before I present my proposal, I discuss problems with three alternative analyses.

2.2.1. The base-generation analysis

If one conjunct functions as an argument and the other as an adverbial, as in (2), the coordinate complex cannot be base-generated at the base-position of either the adverbial or the argument.



The formal relations such as theta role and selection relations between a verb and an argument must be established in a local relation, such as a head-complement or Spec-head relation. If the cluster *how and what* in (2b), for instance, were base-generated as an adverbial of the predicate in the clause, as in (9a), the formal relations between *eat* and *what* could not be established, since the latter is inside an adjunct. If the cluster *how and what* in (2b) were base-generated as an internal argument of *eat*, as in (9b), the intervention of *how* would make the formal relations between *eat* and *what* impossible to establish, too.

Similarly, the coordinate complex composed of the agent *kto* ‘who’ and the patient *kogo* ‘whom’ cannot be base-generated in either the object position or the subject position of the verb in (3a), since they have conflicting theta-roles. If the two arguments formed a coordinate complex at the base-position of one of them, the other could not establish a local relation with its theta-role assignor. Moreover, as I mentioned above, conflicting theta-roles cannot be conjoined.

In addition, wh elements of different functions cannot conjoin in their base-positions in wh in situ languages. Chinese is a WH in situ language. We have seen in (4c) that a coordinate complex of a WH indirect object and a WH direct object can occur in a fronted position; however, such a complex cannot occur in the base position of a (direct or indirect) object:

- (10) Ni dasuan yao juanxian shui (*haiyou/*yiji) duoshapoqian?
 you plan want donate who and/and how.much-money
 ‘Whom and how much money do you plan to donate?’

Furthermore, as pointed out by a reviewer, base-generation analysis is not compatible with the constraint that conjuncts must be identical in syntactic functions (such as subject, object, adverbial, and predicate) (Peterson 2004:650) (see section 2.4 for more discussion).

These theoretical and empirical considerations all falsify the base-generation analysis.

2.2.2. *The pro dependency analysis*

The coordinate complexes of CQWCs cannot be base-generated at their surface positions, associating the gap positions by *pro* binding. As we know, the binder of a *pro* must be a nominal. If the WH coordinate complex is *how and what*, as in (2b), only the nominal conjunct, *what*, can be related to the assumed *pro*. However, I have not seen any case in which a *pro* takes a single conjunct as its antecedent. For instance, the *pro* in (11) is related to the whole coordinate complex *Baoyu he Daiyu*, rather than either one of the conjuncts.

- (11) Zhiyu Baoyu he Daiyu, wo renshi *pro*.
 as.for Baoyu and Daiyu I know
 Possible reading: ‘As for Baoyu and Daiyu, I know them.’
 Impossible reading: ‘As for Baoyu and Daiyu, I know one of them.’

Adger and Ramchand (2005) argue that cross-linguistically, clause-initial WH nominals can be base-generated there. In such wh constructions, the dependency between C and a bound variable *pro* in the clause-internal base position is syntactically licensed by the operation Agree. Agree means that an unvalued feature of one element gets valued by a corresponding feature of another element (Chomsky, 2001). However, their research concludes that bound variable *pros* are not available to English WH questions. One of their arguments is the absence of reconstruction effects in wh-constructions that are derived by Agree, rather than movement, in Scottish Gaelic (p. 170). For instance, the idiomatic reading of (12a) is lost in the relative clause construction in (12b), which is derived by Agree.

- (12) a. Bidh e a’toirt sop a’s gach seid.
 be-FUT he taking wisp from each bundle
 ‘He’s not a very concentrated or focused person.’
 b. ‘S ann a’s gach seid a bhitheas e a’toirt sop.
 It’s from each bundle C-REL be-FUT-REL he taking wisp
 Impossible reading: ‘He tries his hand at *everything*.’
 Possible reading: ‘It’s from every bundle that he has taken a wisp.’

In contrast, as they show (p. 188), the well-recognized reconstruction effects indicate that wh-dependencies in English are derived by movement. (13a) shows the reconstruction for binding theory, and (13b) shows the reconstruction for idiom chunks.

- (13) a. Which picture of himself_i does John_i like best?
 b. How much advantage was taken of John?

In our following CQWC, a binding reconstruction effect is also attested:

- (14) ?Which picture of herself and to whom did Mary sell?
 I thus conclude that no hypothesized *pro* dependency analysis works for CQWCs.

2.2.3. *The deletion analysis*

In this subsection, I examine the possibility of a deletion analysis. Browne (1972:225) proposes that CQWCs are derived by two operations: clausal coordination and then deletion of identical parts. The analysis is similar to that of Giannakidou and Merchant (1998) for a different

type of examples. I first introduce the latter analysis and then come back to comment on Browne's analysis.

Restricting their attention to the construction of [*if/whether* & WH ...], as in (15a), Giannakidou and Merchant (1998) propose that such constructions are derived by "reverse sluicing," which is different from ordinary sluicing in that the antecedent occurs to the right of the missing part. The syntactic representation of (15a) is roughly (15b).

- (15) a. It's not clear [if and when the police arrested the demonstrators].
 b. It's not clear [if [~~the police arrested the demonstrators~~] and when_i [the police arrested the demonstrators t_i]].

This reverse sluicing approach to (15a) has two basic steps: building clausal coordinate complexes and deleting identical parts. The two steps are identical to those used by Browne (1972:225) for CQWCs.

However, regardless of whether (15b) is the correct derivation of (15a), this reverse sluicing approach cannot apply to CQWCs. Let us consider the two possible representations of (16a) (= (2a)), listed in (16B1) and (16B2), respectively, if the sentence is derived by reverse sluicing. In (16b), BWD means Backward Deletion, which affects parts of non-final conjuncts, licensed by overt antecedents in final conjuncts, whereas FWD means Forward Deletion, which affects parts of non-initial conjuncts, licensed by overt antecedents in initial conjuncts.

- (16) a. What and when does John (normally) eat?
 b. What ~~does John (normally) eat~~ BWD and
 B1 when does John (normally) eat ~~what~~ FWD?
 B2 when does John (normally) eat?

(16B1) is problematic because it violates some basic constraints on deletion. Let us see how. BWD follows an edge constraint stated in (17) (Wilder, 1997:84):

- (17) The licensing string of BWD is right-peripheral in its conjunct.

The effect of this edge constraint can be seen in the acceptability contrast between (18c) and (18a). In (18a), the licensing string *the blue soup* in the second conjunct is at the right edge position and the sentence is acceptable. The meaning of (18b) cannot be expressed by (18c), however. This is because the licensing string *the blue soup* in the second conjunct is followed by *with a spoon* and thus is not at the right edge position.

- (18) a. John looked at ~~the blue soup~~ and Mary ate the blue soup.
 b. John looked at the blue soup and Mary ate it with a spoon.
 c. *John looked at ~~the blue soup~~ and Mary ate the blue soup with a spoon.

Similarly, in (19a), the licensing string *yi da dui shu* 'a big pile of books' in the second conjunct is at the right edge position and the sentence is acceptable. The meaning of (19b) cannot be expressed by (19c), however. This is because the licensing string *yi da dui shu* in the second conjunct is followed by *gei wo* 'to me' and thus is not at the right edge position.

- (19) a. Baoyu shao-le ~~yi da dui shu~~, (dan) Daiyu ze mai-le yi da dui shu.
Baoyu burn-PRF one big pile book but Daiyu however buy-PRF one big pile book
'Baoyu burned but Daiyu bought a big pile of books.'
- b. Baoyu shao-le yi da dui shu, Daiyu ze song-le yi da dui shu gei wo.
Baoyu burn-PRF one big pile book Daiyu however send-PRF one big pile book to I
'Baoyu burned a big pile of books but Daiyu sent a big pile of books to me.'
- c. *Baoyu shao-le ~~yi da dui shu~~, Daiyu ze song-le yi da dui shu gei wo.
Baoyu burn-PRF one big pile book Daiyu however send-PRF one big pile book to I

We can see that before the assumed FWD in (16B1), the string *does John (normally) eat* is not the right-peripheral element in the second conjunct, since it is followed by *what*. In order for the string there to be a legal licensing string for the BWD, FWD must apply first. However, before the BWD, the word *what* in the first conjunct is at the left-edge position and the word *what* in the second conjunct is at the right-edge position. According to the parallelism requirement in deletion, the licensing string and the deleted string should not occur in opposite edge positions. This requirement rules out data like (20) and (21b,c). In (20), the deleted *what* is at the right edge of the second conjunct, whereas its licenser, the overt *what* (the underlined one) is at the left edge of the first conjunct. In (21b), the deleted *Lao Li* is at the right edge of the second conjunct, whereas its licenser, the overt *Lao Li* is at the left edge of the first conjunct. In (21c), the deleted *Xiao Wang* is at the right edge of the first conjunct, whereas its licenser, the overt *Xiao Wang*, is at the left edge of the second conjunct.

- (20) *Tell me [what John likes and also who likes ~~what~~].
- (21) a. Lao Li biaoyang-le Xiao Wang, Xiao Wang que piping-le Lao Li.
Lao Li praise-PRF Xiao Wang Xiao Wang however criticize-PRF Lao Li
'Lao Li praised Xiao Wang, however Xiao Wang criticized Lao Li.'
- b. *Lao Li biaoyang-le Xiao Wang, Xiao Wang que piping-le ~~Lao Li~~.
Lao Li praise-PRF Xiao Wang Xiao Wang however criticize-PRF Lao Li
- c. *Lao Li biaoyang-le ~~Xiao Wang~~, Xiao Wang que piping-le Lao Li.
Lao Li praise-PRF Xiao Wang Xiao Wang however criticize-PRF Lao Li

We can see that the FWD in (16B1) is not legal. I conclude that (16B1) is unlikely to be the source of (16a).

(16B2) is also problematic. In the first conjunct, *eat* is a transitive verb, whereas in the second conjunct, *eat* is an intransitive verb. It has been noted in the literature that conjunct reduction cares about the parallelism of the transitivity of the affected verbs in the conjuncts. For instance, in (22), the verb *eats* in the first conjunct is intransitive, whereas the verb *eats* in the second conjunct is transitive. The conjunct reduction (namely here, gapping) cannot apply.

- (22) *Fred eats at Arby's, and my brother-in-law ~~eats~~ pickled beets. (Stillings, 1975)

Kazenin (2001) convincingly argues against any sluicing analysis of CQWCs in Russian and some other languages. A sluicing analysis of CQWCs is not available in Chinese, either. The only possible coordinators that occur in CQWCs are *yiji* and *haiyou*, as seen in (4a,b) and (4c), respectively. Both can conjoin nominal phrases, as in (23a). The *haiyou* version is more informal or colloquial than the *yiji* version. *Yiji* can also conjoin embedded clauses, as in (23b). But neither can conjoin matrix clauses or verbal phrases, as shown in (23c):

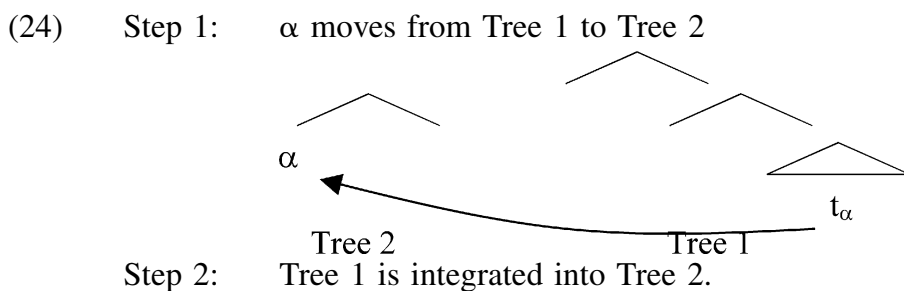
- (23) a. Wo kanjian-le yi wei laonian-ren {yiji/haiyou} ji ge haizi.
 I see-PRF one CL old-man and/and several CL child
 ‘I saw an old man and several children.’
- b. Wo zhidao Li Jiaoshou lai-le yiji ta weishenme lai.
 I know Li Prof. come-PRF and he why come
 ‘I know that Prof. Li has come and why he came.’
- c. Li Jiaoshou lai-le {*yiji/*haiyou/erqie} ta zhu-le haoji tian.
 Li Prof. come-PRF and/and/and he stay-PRF several day
 ‘Prof. Li has come and has stayed for several days.’

This restriction on the coordinators indicates that no CQWC is derived from paired matrix clauses. Thus the deletion analysis is not convincing.

2.3. *Proposal: the coordinate complexes are derived by sideward movement*

We have seen that the three analyses fail to give a proper derivation of the coordinate WH-complexes in CQWCs. In this section, I propose that the derivations of CQWCs involve sideward movement.

Before I spell out my proposal, let me briefly introduce this mode of movement. Generally speaking, the movement of α lands at a position that c-commands the launching site, in the same “tree.” The movement from one tree into another tree is sideward movement. The mode of sideward movement is illustrated in (24).



Since the landing site of a sideward movement is in a different tree from that of the launching site, it neither c-commands nor is c-commanded by the launching site.

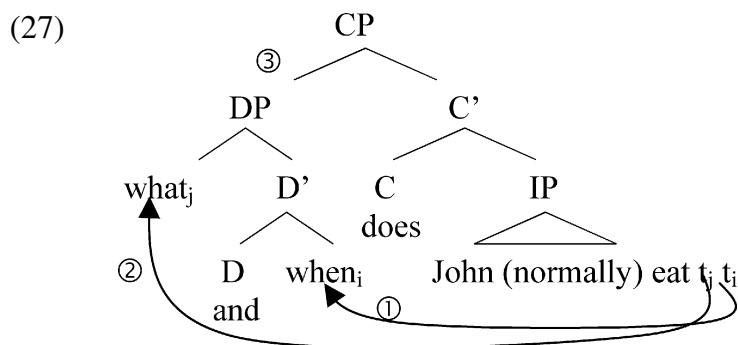
Sideward movement is discussed in Bobaljik and Brown (1997), Nunes (2001), Hornstein (2001), and Nunes and Uriagereka (2000). The existence of sideward movement is expected, if Rmerge (Move), like Merge, simply sets up new syntactic relations. As correctly pointed out by Hornstein and Nunes (2002:27), sideward movement does not add any new constraint to our current computational system. In contrast, it removes the stipulation that movement must target the syntactic object that contains the trace. Hornstein and Nunes (2002) claim that such a stipulation is actually a residue of D-structure, which is not compatible with the Minimalist Program. If no D-structure is assumed and the computational system relies on generalized transformations to build phrasal objects, the landing site of a movement operation may be beyond the domain that contains the trace. “In other words, in a system that may operate with more than one single-rooted syntactic object at once, as in Chomsky, 1995, only brute force would force movement to always target the same tree.” (Hornstein and Nunes, 2002:28). Sideward movement has been argued to account for a number of unrelated phenomena, such as adjunct control, *tough*-movement, and other null-operator constructions (Hornstein, 2001), issues pertaining to

extraction domains (Nunes and Uriagereka, 2000), parasitic gaps, Across-The-Board dependencies (Nunes, 1995, 2001, 2004), PRO-gate effects (Hornstein and Kiguchi, 2003), donkey anaphora (Boeckx, 2003), antecedent-resumptive relations (Kayne, 2002), and head movement (Bobaljik and Brown, 1997).

A plausible derivation of a CQWC is that the two conjuncts first undergo sideward movement independently, remerging with a conjunction in a new working site, and later the newly built coordinate complex is integrated into the clause. The important steps are marked by ①, ②, and ③ below.

I propose that the derivations of (25) contain the main steps in (26).

- (25) What and when does John (normally) eat? (= (2a))
- (26) a. assemble: [_{IP}John (normally) eat what when]
 b. *when* undergoes a sideward movement and is remerged with *and* in the new working site, forming [*and when*]. ①
 c. *what* undergoes a sideward movement and is remerged with [*and when*], building [_{DP} *what and when*].² ②
 d. the complex [_{DP} *what and when*] merges with C' and appears at the SpecCP. ③



The syntactic motivation of the two instances of sideward movement might be related to the occurrence of the coordinator in the Array (a set of lexical items to which the operation Merge applies in a derivation phase). Following Chomsky's (2006:6) idea that a lexical item may have an edge-feature, which permits it to be merged with another syntactic element, we assume that it is the edge-features of coordinators that permit them to be merged with conjuncts. Since Merge iterates, the first integrated element is its complement, and the second integrated element is its specifier (leaving the adjunction structure aside here). As stated in Chomsky (2002:134), a complement is defined as an element with which the head merges first, and a Spec element is defined as an element with which the head merges second. We can further speculate that coordinators have two kinds of features. The first kind is interpretable, giving various semantic features of the projected coordinate complex. For instance, a conjunction projects a plural

² I label the category of a coordinate complex as that of the first conjunct. In (27), the first conjunct is the DP *what*, thus the whole coordinate complex is a DP. Conjunctions such as the English *and* do not have categorial features, whereas conjunctions in many East Asian languages do have categorial features. Data like (32b) show that the category of an *and*-coordinate complex is the same as that of the first conjunct. In (32b), it is the DP *my assistance* that satisfies the c-selection of *on*. Plausibly, the categorial features of an *and*-coordinate complex come from the first conjunct. Therefore, I do not stipulate a syntactic category &, independent of the well-recognized N, A, V, etc. (contra Munn, 1987, among others). The issue discussed in this paper does not bring any empirical difference between my label of coordinate complexes and the construction-specific category &P.

feature, even when each of the conjunct is singular; a disjunction such as *or* projects a disjunctive feature, and adversative coordinators such as *but* projects an adversative feature. The other kind is an edge-feature (or EPP-like feature), which attracts elements to function as conjuncts. Like the edge-feature of other elements, the edge-feature of a coordinator can be checked by either Merge or Move. In CQWCs, it is the latter feature that motivates the sideward movement.

We can predict that if the coordinator is not in the Array of the CP, a regular multiple wh element construction will be derived. In languages such as Russian, Bulgarian, Serbo-Croatian, and Polish, multiple wh elements can all undergo movement. In the Russian examples in (28a,b), both the subject and the object undergo wh-movement. In English, however, only one wh phrase may be fronted, leaving the rest in situ (Pesetsky, 2000, among many others). This is seen in the English translation of (28a,b). In Chinese, all wh phrases remain in situ, as seen in (28c) (= (10)).

- (28) a. Kto kogo ljubit?
 who whom loves
 ‘Who loves whom?’
 b. Kto kogo ty xoces ctoby pobit?
 who whom you want that.SBJUNCTIVE beat
 ‘Who do you want to beat whom?’
 c. Ni dasuan yao juanxian shui duoshapoqian?
 you plan want donate who how.much-money
 ‘Whom and how much money do you plan to donate?’

In addition to this motivation issue, I want to emphasize that in my analysis of CQWCs, the crucial part is the two instances of sideward movement. The non-crucial part is <i> the exact source positions of the elements that undergo the sideward movement and <ii> the exact projection with which the coordinate complex merges.

Point <i> is related to the following observation. In (29) (= (7b)), for instance, the two WH-phrases that undergo sideward movement are not base-generated in the same clause.

- (29) [Kto_i i čto_j] _i xočet, čtoby ja delal _j
 who and what wants COMP I did
 ‘Who wants me to do what?’

Kto ‘who’ is base-generated in the matrix clause and *čto* ‘what’ is base-generated in the embedded clause. However, both can undergo sideward movement to build the coordinate complex with the conjunction *i*. In this example, the source positions of the two WH-phrases are not in the same clause.

Regarding <ii>, consider Chinese data like (30a):

- (30) a. Ni [shenme-yao (yiji) zai shenme-shihou] meitian dou chi?
 you what-medicine and at what-time everyday all eat
 ‘What medicine and when do you take everyday?’
 b. Ni shenme-yao meitian dou chi?
 you what-medicine everyday all eat
 ‘What medicine do you take everyday?’

In (30a), the position of the coordinate complex is to the right of the subject, rather than the left-peripheral position. It is generally recognized that a position between a subject and a verb is a

possible interrogative/focus/topic-operator position in the language, as shown in (30b) (Qu, 1994; Tsai, 1994; Aldridge, 2006). Thus the clause-internal position of the WH-complex in (30b) is not surprising.

2.4. *The issue of the parallelism requirement on conjuncts*

In this section, we address the relation between CQWCs and certain parallelism requirement on coordinate complexes. Consider the following data:

- (31) a. the scene [_{PP} of the movie] and [_{PP} of the play]
 b. *the scene [_{PP} of the movie] and [that I wrote]

In (31b), the first conjunct is a PP and the second one is a clause. In order to account for the unacceptability of data like (31b), Chomsky (1957:36, 1965:212 fn. 9) claims that syntactically different categories cannot be conjoined. This constraint has been referred to as Coordination of Likes Constraint (CLC). Several revised versions of CLC have also been proposed. In order to cover data like (32), in which two conjuncts do not have the same category, Sag et al. (1985:143), among others, claim that conjuncts should belong to the same “semantic categories”, rather than syntactic categories. Peterson (2004:650) claims that conjuncts should be identical in grammatical functions (such as OBJECT, ADJUNCT, and PREDICATE), rather than grammatical categories.

- (32) a. Jermaine is boring and a fool. (Sag et al., 1985) (AP & NP)
 b. You can depend on my assistance and that he will be on time. (NP & CP)

We have already used Peterson’s constraint, which is a revised version of CLC, as well as other constraints, to explain why the coordinate wh complexes in CQWCs cannot be base-generated (section 2.2.1). Now our question is why the coordinate wh complexes can occur in the derived positions.

First of all, I have argued that the two wh phrases of a CQWC form a coordinate complex in a new working site. The two wh phrases fulfill their functions as either argument or adjunct of the predicate in their base-positions, before they undergo sideward movement. After the movement, in the new working site, they are neither argument nor adjunct of any verbal element. They are simply wh phrases. They thus do not have conflict grammatical functions in the new working site. In this sense, the coordination does not violate Peterson’s constraint.

On the other hand, it is not the case that any two elements may form a coordinate complex in a new working site. The two conjuncts of a CQWC are both wh phrases. If we replace one of them with a non-wh phrase, or if we replace both with non-wh phrases, keeping the coordinate complex in a derived A’-position, as in (33a) and (33b), respectively, the acceptability pattern may change:

- (33) a. *How and the watermelon did John eat?
 b. *Cheerfully and the watermelon, John ate.

Following Chomsky (2001), I assume that in all overt movement operations, certain features of the moved element check corresponding uninterpretable features of the attractor (or certain features of the moved element value corresponding unvalued features of the attractor). In a

regular wh movement construction, the interpretable [Q] feature of the wh phrase checks the uninterpretable [Q] feature of C. Similarly, in a regular topicalization construction, the interpretable [Topic] feature of the moved topic phrase checks the uninterpretable [Topic] of a function head in the C-domain. In order to check the uninterpretable feature of the attractor, the moved element may not contain any checking features with conflict values. In (33a), *how* has [Q] but *the watermelon* has [–Q]. They cannot form any unified [Q] element to check the [Q] of C. In (33b), *the watermelon* may have [Topic] feature, but *cheerfully* has [–Topic]. Moved manner adverbs may have [Focus] features but not [Topic] features. Thus the two conjuncts in (33b) cannot form any unified [Topic] element to check the [Topic] of C there.

The same constraint applies to the checking of [D] and [Case] of T by the raised subject. The raised subject must have a unified D feature and Case feature. In (34), the conjunct *Tom* has [D] and [Case], whereas the conjunct *on Monday* has [–D] and [–Case]. Although both may undergo sideward movement, their conflict features cannot check the relevant features of T.

(34) *Tom and on Monday wrote the paper.

The above discussion also captures the following acceptability contrast (see Cheung, 2006)³:

- (35) a. *The book and what did John buy?
 b. Ta mai-le shu he shenme (ne)? (Mandarin Chinese)
 he buy-PRF book and what Q
 ‘What is the thing x such that he bought some books and x?’
 c. Taro-wa niku to nani-o kattano? (Japanese)
 Taro-TOP meat and what-ACC buy
 ‘What is the thing x such that Taro bought some meat and x?’

A coordinate complex that has a wh conjunct and a non-wh conjunct may remain in situ, as seen in (35b) and (35c), but not in a derived position, as seen in (35a). Note that all conjuncts in (35) are nominals, satisfying CLC. Thus the acceptability contrast cannot be covered by CLC. Not only wh-dependency in data like (35b,c), but also other kinds of dependency, such as the reflexive binding in (36a) and the negative polarity item licensing in (36b), can be established with a single conjunct of an in situ coordinate complex.

- (36) a. John paid for Mary and himself out of his own pocket. (Dougherty, 1970b:863)
 b. God is never finished with me or any of us.

The contrast between the unacceptable (33), (34), and (35a) on one side and the acceptable (35c) and (36) on the other side suggests that CQWCs are possible simply because both conjuncts

³ Unlike in wh in situ languages, no in situ coordinate complex that is composed of a wh conjunct and a non-wh conjunct is acceptable in English (Cheung, 2006):

- (i) *Which detective saw [John and which student]?
 (ii) *Who reported that [Max and who] disappeared?

(ii) is treated as acceptable in Bošković and Franks (2000:109–110). However, not only my informant rejects both (i) and (ii), but also I fail to find any example of English coordination of a wh and non-wh element, by a Google search.

As we know, in situ wh phrases in English must be licensed by a moved wh phrase. The properties of such in situ wh elements are different from those in Chinese and Japanese. See Pesetsky (2000) for a movement analysis of English in situ wh phrases.

have unified value of the checking features and the coordinate complex is in a derived position. Future research may lead us to a better understanding of this generalization.

2.5. Section summary

Summarizing, I have argued that a CQWC is derived by two instances of sideward movement of the two WH-phrases, so that the WH-phrases can build a coordinate complex with a conjunction in a new working site, and then the complex is integrated into the clause. This study shows how the landing site freedom of sideward movement makes the syntactic derivation of such constructions possible, while avoiding the problems of the alternative analyses.

3. Interwoven dependency construction

3.1. Interwoven dependencies

The IDC example introduced in section 1 is repeated here as (37):

(37) [[Which nurse]_i and [which hostess]_j]_k did Fred date _{-i} and Bob marry _{-j}, respectively?

IDCs have been noted in Dougherty (1970), McCawley (1988), and Postal (1998), among others. In addition to the type of data represented by (37), IDCs are observed in a wider range of data. In each example of (38), the coordinate subject complex also seems to have split traces, if we adopt the hypothesis that subjects are base-generated below TP and are raised to SpecTP. Note the cross-category nature of the predicates of the data: they can typically be PP, AP, and various projections extended from VP (the data are from Dougherty 1969:628, 1970a:527, 544, Scha, 1981, Link 1984:246, McCawley, 1988:536, Krifka 1990:165, and Postal 1998:108, 162):

- (38) a. [Hans and Fritz]_k are from Germany and from Switzerland.
 b. [Logical and empirical truth]_k are necessary and contingent, respectively.
 c. [John and Bill]_k were certain to leave and ready to leave respectively.
 d. [John and Bill]_k should go to N.Y. and will go to Chicago respectively.
 e. [Kim and Sandy]_k sang and danced, respectively.
 f. [George and Martha]_k respectively denounced and were denounced by the governor.

The IDCs contain a coordinate DP-complex, DP_k in (37) and (38). One can locate the base-position of each conjunct of the DP-complex in the construction, but not the launching site of the whole complex. For instance, in (37), the base-position of *which nurse* should be the object position of *date*, which is inside the first clausal conjunct; and the base-position of *which hostess* should be the object position of *marry*, which is inside the second clausal conjunct. However, we cannot find the launching site of the complex *which nurse and which hostess*.

Moreover, in the following example, if the two PP conjuncts have undergone A-bar fronting from the two predicate conjuncts respectively (McCawley 1988:538), the sentence can also be treated as an IDC.

(39) On Fridays and (on) Saturdays, John respectively teaches and goes surfing.

IDCs are observed in Chinese, as well. Like in English, subjects are raised out of their theta-positions in Chinese (Huang, 1993). In the following data, the coordinate subject complexes are related to the coordinate predicate complexes (for more data see Lü et al., 1980 [1999:208] and Hou, 1998:206).

- (40) a. Na yi nian, Xiao Zhou he Xiao Chen fenbie jin-le gongchang he
 that one year Xiao Zhou and Xiao Chen respectively enter-PRF factory and
 can-le jun.
 join-PRF army
 ‘In that year, Xiao Zhou and Xiao Chen started to work in a factory and
 joined the army respectively.’
- b. Zai Bolin, Xiao Tang he Xiao Tsai fenbie kan-le huazhan he
 at Berlin Xiao Tang and Xiao Tsai respectively see-PRF gallery and
 ting-le yinyuehui.
 listen-PRF concert
 ‘In Berlin, Xiao Tang and Xiao Tsai visited galleries and listened to music
 in concerts respectively.’

In the following data, the conjoined antecedent nominals are related to the object gaps in the conjoined relative clauses in a distributive manner. Note that the distributive readings are ensured by the s-selection of the verbs. Specifically, in (41a), for instance, *chuan* ‘wear’ s-selects *xuezi* ‘boot’, but not *maozi* ‘cap,’ and *dai* ‘put on’ s-selects *maozi* but not *xuezi*. Thus the first verb is associated with the first conjunct of the nominal coordinate complex only, and the second verb is associated with the second conjunct of the nominal complex only. The parallel point can be seen in (41b).

- (41) a. Wo faxian-le yiqian [Baoyu chuan de] he [Daiyu dai de]
 I discover-PRF past Baoyu wear MOD and Daiyu put.on MOD
 naxie hen zhiqian de [xuezi he maozi].
 those very expensive MOD boot and cap
 ‘I discovered those expensive boots and caps that Baoyu wore and Daiyu put
 on in the past.’
- b. [Baoyu xihuan he de] he [Daiyu xihuan chi de] [jiu he qiaokeli] dou
 Baoyu like drink MOD and Daiyu like eat MOD wine and chocolate all
 zai zheli.
 at here
 ‘The wine and the chocolate that Baoyu likes to drink and Daiyu likes to
 eat are all here.’

IDCs are observed cross-linguistically, although their syntactic derivations have not been well studied. They have been claimed to be a challenge to any framework of generative syntax. Postal (1998:163) ends his book with the following comment: “Such a challenge can be avoided only under pain of maintaining a theory that denies that interwoven dependency structures occur in natural languages.”

Before I present my analysis of the constructions, I make some clarifications.

3.2. Two clarifications

I clarify two issues in this subsection: the relation between IDCs and other similar constructions, and the role of the adverb *respectively* in IDCs.

3.2.1. IDCs versus some other similar constructions

Like CQWCs, IDCs exhibit dependencies between one coordinate complex and two syntactic gaps, with each conjunct of the complex associated with one of the gaps, respectively. IDCs are thus different from the ungrammatical multiple WH-extraction constructions such as (42a), in that the two WH-phrases form a coordinate complex. The computation problems in data like (42) are discussed in Zhang (2004).

- (42) *Kogo chto ty videl i kupil? (Russian)
whom what you saw and bought

Moreover, Wh IDCs such as (37) are also different from multiple embedding WH-movement constructions such as (43) (Sag, 2000:2), again, in that the two WH-phrases form a coordinate complex.

- (43) John found the saucer [which Mary put the cup [which I poured the tea into _] on _]

3.2.2. The role of the adverb *respectively* in IDCs

IDCs, by definition, have a distributive reading, thus, the adverb *respectively* is always allowed. The adverb *respectively* does not occur if the distributive reading is clear in the IDC sentence, as in the following.

- (44) [The dogs and the roosters]_k barked and crowed all night.

The presence of the adverb is required to disambiguate the interpretation of the construction. In the IDC data, if the adverb *respectively* does not occur, the sentences can be ambiguous between the IDC reading (distributive) and the Across-The-Board dependency reading, if the semantics and pragmatics of the sentences allow the latter reading. In the latter reading, the sentence-initial coordinate complex is semantically related to the two clausal or predicate conjuncts simultaneously (Postal 1998:136). For instance, the Across-The-Board reading of *How many frogs and how many toads did Greg capture and Lucille train* is a question asking for such two numbers, x and y , that Freg captured the x frogs and Lucille trained x frogs; and that Freg captured y toads and Lucille also trained y toads. Since IDCs are not Across-The-Board constructions, I do not discuss the syntax of the Across-The-Board dependency in this paper.

The occurrence possibility of *respectively* distinguishes IDCs from other constructions. The following coordinate complexes do not allow the occurrence of *respectively*. They are not IDCs.

- (45) a. John and Mary are my two best friends and two oldest colleagues
(*respectively).
b. I consider John and Mary two excellent philosophers but two lousy parents
(*respectively). (see Heycock and Zamparelli, 2003:28)

Semantically, the adverb *respectively* is licensed by a plural element in the context. In IDCs, it is licensed by the two coordinate complexes. Syntactically, the adverb is an adjunct in the

constructions. It can be merged at either the left or the right of vP or any projection higher than vP. In (39), for instance, it is merged to the left of vP, and thus it surfaces between the raised subject *John* and the coordinate predicate *teaches and goes surfing*. In some other IDC examples, the adverb occurs at the sentence-final position. In this case, it may be merged to the right of vP or some higher projection. I will not consider the adverb in my proposed syntactic derivations of IDCs.

3.3. IDCs are derived by parallel movement dependencies

I argue that IDCs should be analyzed by movement originating from the clausal conjuncts. I have three arguments.

First, if we cannot extract an indirect object,⁴ we cannot do so in IDCs, either (Postal, 1998:135). In (46a), the object of the preposition *to* is moved, whereas in (46b), the indirect object is moved. The parallel acceptability pattern between (46) and (47) shows that the IDCs in (47) obey the same constraint on movement seen in (46).

- (46) a. [Which nurse] did Ernst sell cocaine to *t* (and George sell heroin to *t*)?
 b. *[Which nurse] did Ernst sell *t* cocaine (and George sell *t* heroin)?
- (47) a. [[Which nurse]_i and [which hostess]_j]_k did Ernest sell cocaine to _i and George sell heroin to _j, respectively?
 b. *[[Which nurse]_i and [which hostess]_j]_k did Ernest sell _i cocaine and George sell _j heroin, respectively?

Second, if reflexive binding is a local structural relation, Postal's (1998:161) analysis of the following example supports the occurrence of parallel movement dependencies. In such data, the WH-phrases can license their respective reflexives before they move:

- (48) [Which man]_i and [which woman]_j did respectively the doctor talk to _i about himself_i, and the lawyer talk to _j about herself_j?

The reflexive binding follows the strict gender and number agreement between the antecedents and the reflexives.

Third, if s-selection is also a local structural relation, we expect that in the following IDC, *how many cakes* is base-generated in the VP headed by *bake*, since the latter s-selects the former. Similarly, we expect that *how many letters* is base-generated in the VP headed by *write*, since the latter s-selects the former.

- (49) How many cakes and how many letters, respectively, did Mary bake _i and John write _j this morning?

The s-selection relation between the verbs and the objects in the Chinese IDCs in (41) and the s-selection relation between the predicates (*barked, crowed*) and the subjects (*the dogs, the roosters*) in (44) show the same point.

⁴ See Bruening (2001:236 fn. 5) for a recent discussion of the dialect variations regarding whether indirect objects can be moved.

Fourth, the gaps in IDCs cannot be bound variable *pros*, since such *pros* are not available to English WH questions (Adger and Ramchand, 2005).

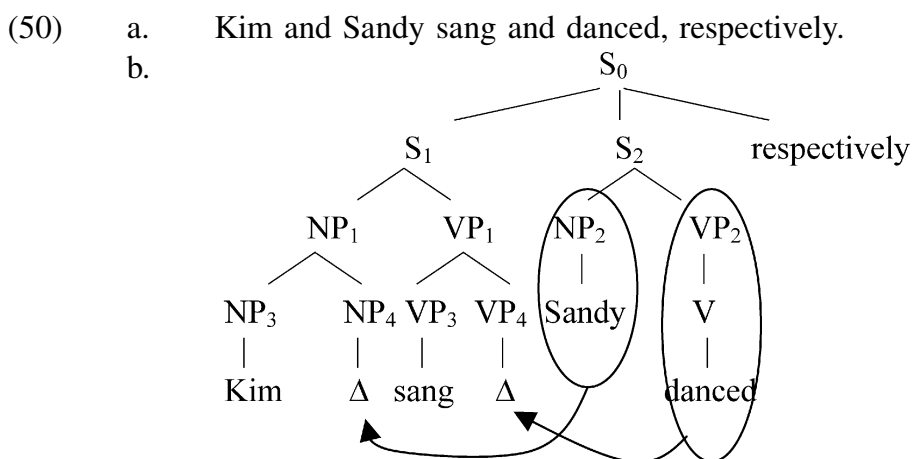
I conclude that the coordinate nominal complexes in IDCs are not base-generated in their surface positions.⁵

3.4. Deriving IDCs by sideward extraction from conjuncts

If the coordinate nominal complexes in IDCs are not base-generated in their surface positions, they must be derived by movement. Postal (1998:160–162) has convincingly argued that the whole coordinate WH-complex in data like (37) cannot be moved from the gap position of either of, or both of, the clausal conjuncts. We have seen that this is intuitively right: one gap is semantically related to one conjunct of the WH-complex, and the other gap is semantically related to the other conjunct of the WH-complex. There is no source position for the whole coordinate WH-complex in the two clausal conjuncts.

3.4.1. Dougherty's (1970) derivation

While Postal (1998) uses IDCs to challenge generative syntactic theory, Dougherty (1970a,b) proposes a syntactic derivation for IDCs in the generative framework. In Dougherty's approach, IDCs are derived by the so-called *Respectively* Substitution Transformation (Dougherty 1970a:544, 1970b:887). In his approach, the subject of the second conjunct moves to the subject of the first conjunct to fill in a dummy element introduced by his phrase structure rules, and the predicate of the second conjunct also moves to the predicate of the first conjunct to fill in a dummy element introduced by the phrase structure rules. According to this *Respectively* Substitution Transformation, (50a) should be derived from the structure in (50b):



Dougherty (1970b:887) states that “The *Respectively* Substitution Transformation operates to ‘fill in’ dummy elements introduced by the phrase-structure rules of the base.” In (50b), there are two dummy elements, NP₄ and VP₄, each marked by Δ. They are replaced by NP₂ and VP₂, respectively.

⁵ Postal (1998) discusses IDCs in the Right Node Raising constructions, as in (i), trying to show that RNR is derived by extraction.

(i) John loves and Mary hates oysters and clams, respectively. (Postal, 1998:134)

See our footnote 1 for a Right Node Raising construction that is parallel to a CQWC. I leave these “right” constructions for future research.

The techniques used in Dougherty's derivation are problematic, from the current generative grammar viewpoint. For instance, the generation of the dummy elements are not justified locally. They are created to be replaced later, without any local motivation.

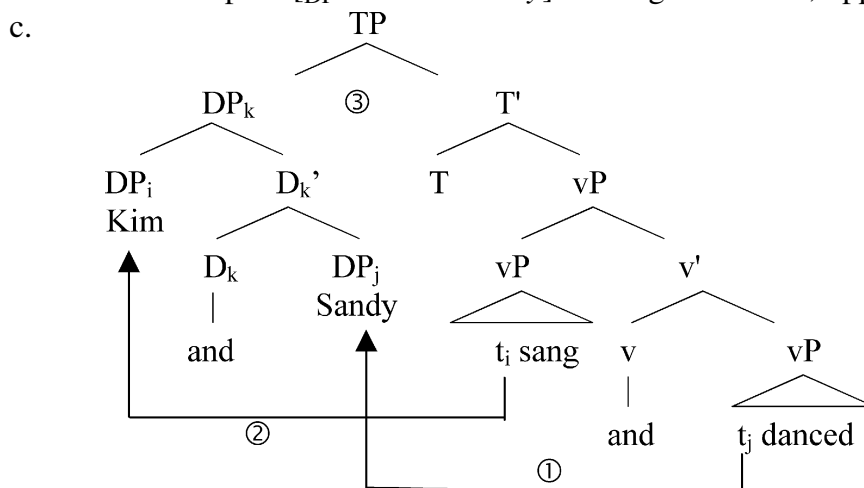
We thus must pursue a new analysis of IDCs.

Before I propose my own derivations of the constructions, I want to follow the suggestion of a reviewer to address the theoretical implications of the problems of (50b). We can see that before the two movement operations occur, the whole sentence structure has been built, with all lexical items and dummy elements inserted in the relevant syntactic positions. Such a pre-movement structure is the so-called D-structure in the pre-minimalist generative grammar. The problems of (50b) falsify the notion of D-structure, which has been abandoned in the minimalist program (Chomsky, 1993). Like (50b), the problems of the D-structures in (9a) and (9b) also provide evidence against D-structure.

3.4.2. My proposal

So far, I have shown that IDCs involve multiple movement dependencies. I propose the following derivations for IDCs. The sentence in (51a), for instance, is derived from the steps in (51b) and the structure in (51c). The important steps are marked by ①, ②, and ③ (as stated in section 3.2.2, we ignore the adverb *respectively* in our representations).

- (51) a. Kim and Sandy sang and danced, respectively.
 b. Assemble: [_{vP} Sandy danced];
 The nominal *Sandy* undergoes a sideward movement and is remerged with *and* in the new working site, forming [_{DP} *and Sandy*]; ①
 Assemble: [_{vP} Kim sang];
 The nominal *Kim* undergoes a sideward movement and is remerged with [_{DP} *and Sandy*], building [_{DP} *Kim and Sandy*]⁶; ②
 The two vPs and the conjunction *and* form a coordinate vP complex;
 The coordinate vP complex is merged with T and T' is projected;
 The complex [_{DP} *Kim and Sandy*] is merged with T', appearing at SpecTP. ③



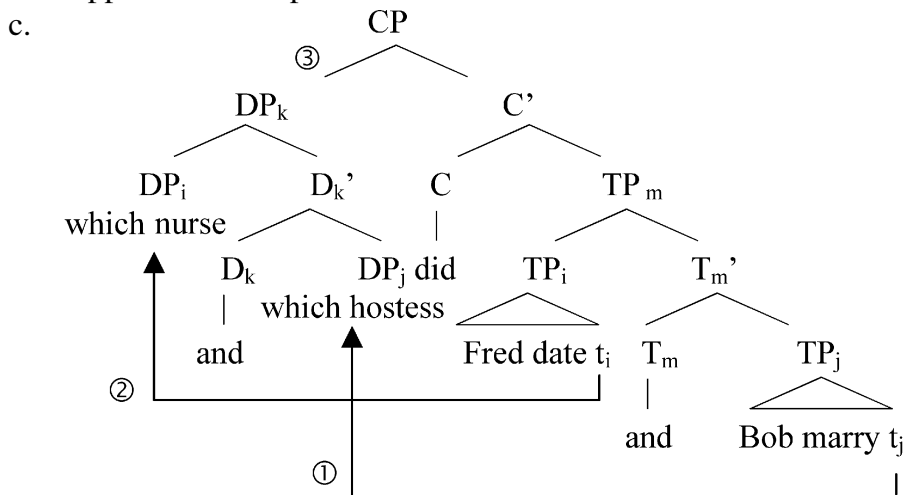
Keep in mind that when *Sandy* undergoes the sideward movement, DP_k does not exist yet, and the merger of DP_k with T' occurs even later. Thus, from the local perspective, the sideward

⁶ See footnote 2.

movement of *Sandy* does not violate the Extension Condition, the requirement that substitution operations in overt syntax always extend their target (Chomsky, 1993).

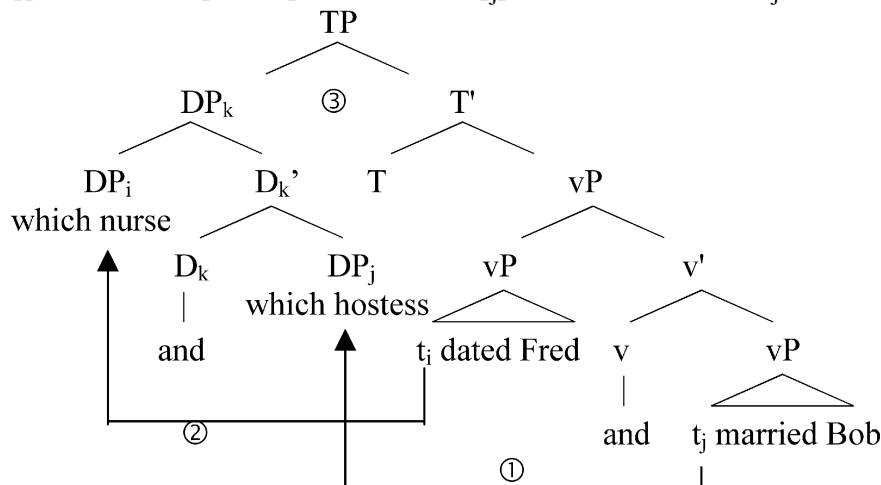
Similarly, (52a) is derived from the steps in (52b) and the structure in (52c).⁷

- (52) a. [[Which nurse]_i and [which hostess]_j]_k did Fred date t_i and Bob marry t_j, respectively?
 b. Assemble: [TP Bob marry which hostess];
 The phrase *which hostess* undergoes a sideward movement and is remerged with *and* in the new working site, forming [*and which hostess*]; ①
 Assemble: [TP Fred date which nurse];
 The phrase *which nurse* undergoes a sideward movement and is remerged with [*and which hostess*], building [_{DP} *which nurse and which hostess*]; ②
 The two TPs and the conjunction *and* form a coordinate TP complex;
 The coordinate TP complex is merged with *did* at C;
 The complex [_{DP} *which nurse and which hostess*] is merged with C' and Appears at the SpecCP. ③



Similarly, the sentence in (53a) is derived from the structure in (53b):

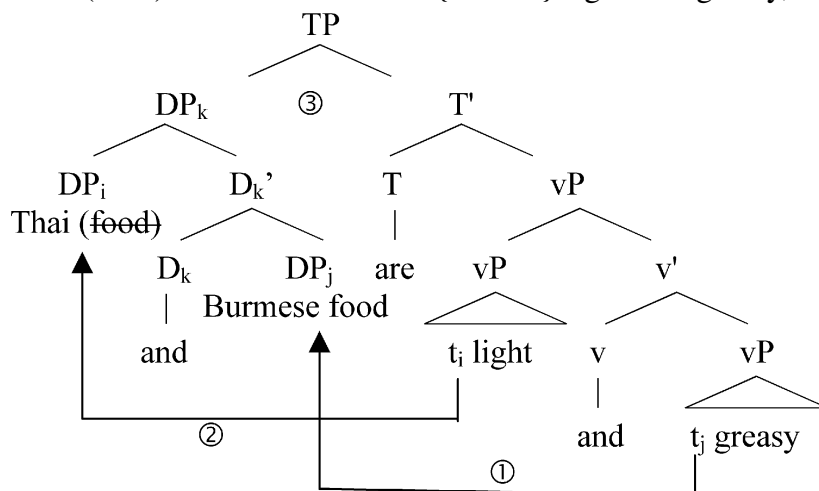
- (53) a. [[Which nurse]_i and [which hostess]_j]_k t_i dated Fred and t_j married Bob respectively?
 b.



⁷ I also put aside the exact derivation for the Across-The-Board dependency of the auxiliary *did* in (52). See Nunes (2001, 2004) for one hypothesis.

Similarly, the sentence in (54a) is derived from the structure in (54b)⁸:

- (54) a. Thai (food) and Burmese food {are/*is} light and greasy, respectively.
 b.



Following Postal (1998:108), we assume that *food* in *Thai food* can be deleted at PF.

In this proposed derivations, there are two parallel movement dependencies. Each movement has its own landing site and launching site. Specifically, each DP traveler undergoes a sideward movement, landing at a position that neither c-commands nor is c-commanded by the launching site. The landing working site of each raised DP is different from the launching working site. The landing site is in the working site of the coordinating head of DP_k, whereas the launching site is in the working site of a vP. In the derivations illustrated above, the movement in step ② is not blocked by the movement in step ①, because the landing site of the movement in step ① does not c-command the launching site of the movement in step ②. The two positions are in different working sites.

The syntactic motivation of the two instances of sideward movement, as in the case of CQWCs, might be related to the coordinator, which is presumably in the subarray determined by C. We can see that in an IDC, there are two coordinators: one links two clausal conjuncts together (two TPs in (52c), and two vPs in (51c), (53b) and (54b)), and the other is the one that attracts the two nominals that undergo sideward movement.

Note that in this proposed derivation of IDCs, DP_i and DP_j are extracted from two conjuncts, respectively. This derivation does not violate the Coordinate Structure Constraint (CSC), which states that no element may move out of single conjuncts (Ross, 1967). CSC can be viewed as a parallelism requirement, which bans asymmetrical syntactic dependencies between conjuncts. Across-The-Board constructions such as (55) exhibit parallel syntactic dependencies between conjuncts and are thus compatible with CSC:

- (55) [Which nurse]_i did Fred date _i and Bob marry _i?

⁸ I ignore the issue whether the copula is base-generated at T or is raised to T from a position above the coordinate vP-complex (see Roberts, 1998). Moreover, the vP in (54b) can also be labeled as aP or PrP. The two issues are irrelevant to my argumentation.

Like Across-The-Board constructions, IDCs also manifest parallel syntactic dependencies, and thus are also compatible with CSC.

3.5. The agreement pattern of IDCs

In this subsection, I discuss how this new analysis of IDCs covers their agreement pattern.

In an IDC, semantically, each conjunct of the left-peripheral coordinate complex is related to a clausal conjunct. If the two conjuncts of the left coordinate nominal are associated with the subjects of the two clausal conjuncts, the number inflection of the verb or auxiliary in each clausal conjunct is always plural, even when each of the related nominal in the left-peripheral coordinate complex is singular.

- (56)
- a. *John and Bill eats a doughnut and drinks coffee (respectively). (Artstein, 2002:48)
 - b. *dani ve-yosi gavaoh ve-namux (Hebrew, Artstein, 2002:48)
Dany and-Yossi tall.sg and-short.sg
 - c. Sue and Karen jog and drive respectively. (Eggert, 2000:104 (33))
 - d. [Logical and empirical truth]_k {are/*is} necessary and contingent, respectively.
 - e. [Thai and Burmese food]_k {are/*is} light and greasy, respectively.

This plural agreement pattern of IDCs is captured by our proposed analysis. In (54b), for instance, the DP_k is merged with T', occurring at the position that has an agreement relation with T, whose agreement features license the agreement features of the verb. As we know, all conjoined nominals are plural. The plural feature may come from the conjunction. When a conjoined nominal occurs at SpecTP, as in (54b), it is expected to trigger plural agreement on the auxiliary or verbal element.

If the two conjuncts of the left coordinate nominal are not associated with the subjects of the two clausal conjuncts, the coordinate nominal does not trigger any agreement with T:

- (57) Which book and which magazine {does/*do} John like and Mary hate, respectively?

Data like (57) have the same syntactic structure as that of (52a). In my proposed structure in (52c), the coordinate nominal is merged with C'. Since it does not have a Spec-head relation with T, it does not trigger any agreement with T. In (57), the auxiliary *does*, like *did* in (52a), has an Across-The-Board relation with the two verbs (see footnote 7).

Data like (56) show the derivational nature of agreement, since the auxiliary or verb agrees with whatever in SpecTP. Moreover, the plural feature of the verbal elements does not match the fact that each of the verbal elements has a singular external argument. This mismatch is predicted by the claim that number features on verbal elements are not interpretable (Chomsky, 1995).

3.6. Section summary

IDCs have been claimed to be a challenge to the current generative syntactic theories. I have argued that the two conjuncts of the left coordinate complex in an IDC first undergo

sideward movement from the gap positions independently, and form a coordinate complex with a conjunction, and later the newly built coordinate complex is integrated into the complex clause.⁹

4. Conclusion

By adopting the device of sideward movement, I have proposed derivations for CQWCs and IDCs. The analysis here shows how the landing site freedom gained from sideward movement (e.g. Bobaljik and Brown, 1997; Nunes, 2001) makes the syntactic derivations of certain special constructions possible, while avoiding the problems of alternative approaches.

CQWCs and IDCs are different. The former have only one coordinate complex, whereas the latter have two. Nevertheless, the two constructions share an important property: the left coordinate complex must have a unified value of the checking features (such as [Q] feature), which allow the complex to be integrated into the original (complex) clause.

The analysis of this paper shows the explanatory power of the newly realized sideward movement, since the movement solves problems of the derivations of the two constructions.¹⁰

Acknowledgements

Early versions of this paper have received help from many people. My thanks go to Benjamin Shaer, Philippa Cook, Laura Downing, and the linguistic communities of the University of Toronto, National Chiao Tung University, and National Chung Cheng University for their data help, to Marcel den Dikken, Henk van Riemsdijk, Juan Uriagereka, and other participants of GLOW 29 (Barcelona, April 5–8, 2006) for comments, and to James Myers for data, comments, and English advice. I am very grateful to the two anonymous reviewers for many suggestions to improve the paper. This research has been supported by the National Science Council Grant 95-2411-H-194-023-MY2 (Taiwan).

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⁹ One might wonder whether IDCs display island effects. Theoretically, it has been claimed in the literature that sideward movement permits extraction from islands if the islands are not yet integrated into the core structure (see Nunes and Uriagereka, 2000; Hornstein, 2001; Nunes, 2004; Taylor, 2006). In October 2002, I asked six native English speakers about their judgment of the following adjunct island and tensed wh-island sentences:

- (i) a. How many frogs and how many toads, respectively, did Greg get a prize after capturing and Lucille get a prize after training?
 b. How many frogs and how many toads, respectively, did Greg ask who has captured and Lucille ask who has trained?

Almost half of the informants accepted the two sentences and the other half rejected them. The inconsistent acceptability pattern might tell us that IDCs do not display clear island effects.

¹⁰ The explanatory power of sideward movement might also be seen in dealing with other constructions, such as the Japanese construction discussed in Takano (2002). Similar to this study, Takano's study leads him to state that "I suggest that UG has a way of conjoining derived constituents, in addition to base-generated ones" (p. 275. I thank a reviewer for bringing my attention to Takano's work).

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