Journal of East Asian Linguistics
https://doi.org/10.1007/s10831-024-09283-z

# Unraveling syntactic puzzles of comparative correlatives

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Received: 15 December 2023 / Accepted: 21 August 2024


**Abstract** In a comparative correlative construction, such as *The less you read, the stupider you are*, the two clauses must both be finite, like a root clause; but neither can stand alone, like a subordinate clause. The construction shares significant formal properties with one type of coordinate construction, such as *You drink another can of beer and I'm leaving*. The paper argues that a comparative correlative construction and such a coordinate construction have the same syntactic structure. In this structure, a functional element that is directly merged with a conjunct or a modifier occurs. Moreover, the construction-specific formatives, such as the clause-initial *the* or the Mandarin predicate-initial *yue* 'more', is analyzed as the result of the spanning of this functional element with another functional element in the clause. Furthermore, the pairing of the formatives in the construction comes from the Double Marking of this functional element.

**Keywords** Comparative correlative · J · Conditional conjunct · Span · Double marking

## Introduction

The term Comparative Correlative (CC) is from Culicover and Jackendoff (1999) (C&J hence). Examples of the construction are (1a) in English and (1b) in Mandarin Chinese.

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Published online: 23 October 2024

(1) a. The cooler the weather got, the happier Susie became.
Reading: {If/When/As} the weather got cooler, Susie became happier. (C&J: 545)

b. 天氣越涼快，　阿英越快樂。
Tiānqì　yuè　liángkuài,　Āyīng　yuè　kuàilè.
weather　more　cool　Aying　more　happy
'The cooler the weather got, the happier Susie became.'

A CC has two clauses. In (1a), the first and the second clause are called antecedent clause and consequent clause, respectively (Beck (1997).[1] Let us simply call them S1 and S2, respectively. Research works on CCs include Fillmore et al (1988), McCawley (1988), Beck (1997), C&J, den Dikken (2005), Abeillé et al (2006), Lin (2007), Liu 2008, Abeillé & Borsley (2008), Taylor (2013), E (2014), and Soltan (2020).[2] However, basic questions like the following still have not been adequately explained: what is the syntactic relation between the two clauses, why the special use of the formatives (such as the clause-initial *the* in English CCs and predicate-initial *yuè* 'more' in Mandarin CCs) is not available in other constructions, and why the special formatives occur in pairs.

The goal of this paper is to show that S1 of a CC shares significant properties with one type of conjunct. All the puzzles mentioned above are related to the occurrence of a functional element, which occurs in both coordinate and modification constructions.

In the degree syntax of CCs, an operator moves in each of the two clauses. The issue has been explored by the previous studies mentioned above.[3] In this paper, focusing on the syntactic relation between the two clauses of a CC, I do not discuss

[1] The antecedent does not have to be the cause of the consequent in a CC. See Liu (2008: 1035).

[2] In this paper, I do not discuss the Reversed CC, such as (i) (McCawley 1988: 176; C&J; Taylor 2013).

(i) I understand this problem (*the) less, the more time I spend on it.

I also do not discuss the construction that contains a pair of wh-degree expressions, instead of comparative expressions (cf. den Dikken 2005, E 2014: 91), such as (ii). In Zhang (2021), such a construction is analyzed as an equative construction. I leave a comparison of such a construction and a CC for future research.

(ii) Zhìmíng　duō　gāo,　Ājiāo　(jiù)　duō　gāo.　志明多高, 阿嬌(就)多高。
Zhiming　how　tall　Ajiao　then　how　tall
'Ajiao is however tall Zhiming is.'

[3] One clause-internal issue is whether a THAN-phrase is allowed in a CC (cf. Beck 1997; den Dikken 2005: 523). Such a phrase is allowed in Mandarin (McCawley 1988: 183), as seen in (i), and Egyptian Arabic (Soltan 2020).

(i) Tā　yuè　bǐ　wǒ　qiáng,　wǒ　yuè　gǎndào　zìháo.　他越比我強, 我越感到自豪。
he　more　than　I　strong　I　more　feel　proud
Lit.: 'The more he is stronger than me, the prouder I feel.'

the internal structure of each of the clauses. Instead, I will just explain the above general puzzles.

In Sect. 2, I present the three puzzles mentioned above. In Sect. 3, showing certain shared properties of a CC and a special type of coordination, I argue for a new analysis of the relation between the two clauses of a CC: they have the same syntactic positions as those of the two conjuncts of the type of coordination. In Sect. 4, I explain the three puzzles. Sect. 5 concludes the paper.

## Three puzzles

In this section, I report three puzzles of CCs. They either challenge the available analyses, or remain unexplained so far. These puzzles are not language-specific.

### The structural relation between the two clauses

A CC is a paired-clause construction. Neither of its two clauses can occur independently. Compared to (2a), (2b) and (2c) are not acceptable.

(2) a. The cooler the weather got, the happier Susie became.
b. *The cooler the weather got.
c. *The happier Susie became.

Obviously, neither clause is an argument of any lexical element of the other clause. When two clauses have no argument relation to any lexical element, either one of them is a modifier of the other, or both are conjuncts of a coordinate construction.

In the literature, S1 of a CC has been assumed to be an adjunct to S2 (e.g., Beck 1997: 234; den Dikken 2005), or a focus that adjoins to S2 (E 2014), or a topic to S2 (Tsao & Hsiao 2002 and Soltan 2020). In all these approaches, S2 is assumed to be a root clause and S1 is subordinate to it. However, between S1 and S2, neither shows root clause properties consistently, and neither shows non-root clause properties consistently, either.

#### *Both may exhibit properties of root clauses*

On the one hand, S2 of a CC may exhibit properties of root clauses, taking S1 as its subordinate.[4] For example, in English, it is possible to form a tag question with S2, but not with S1, as seen in (3) (C&J: 548). Also, subject-auxiliary inversion is possible in S2 but not in S1, as seen in (4) (C&J: 559) (I assume that *does* in (4a) surfaces in FiniteP).

(3) a. The more we eat, the angrier you get, don't you?
b *The more we eat, the angrier you get, don't we?

[4] A subordinate of X can be either an argument or non-argument (e.g., a modifier) of X. As used in the literature of CCs, the term subordinate is used in the latter sense only in this paper.

(4) a. ?The more Bill smokes, the more does Susan hate him.
b. *The more does Bill smoke, the more Susan hates him.

On the other hand, S1 of a CC may also exhibit properties of root clauses. Both root and non-root clauses can be finite, but only root declarative clauses reject non-finite forms. An adverbial clause, including a conditional one, does not have to be finite (Abeillé and Borsley 2008: 1146, 1150). In each example in (5), the left conditional is a nonfinite clause. One might claim that some of them come from ellipsis, but those in (5e) and (5f) are clearly nonfinite.

(5) a. This proposal, if accepted by Parliament, will mean fundamental changes to the education system.
b. If consulted, I would have advised against it.
c. Unless done, we don't go.
d. If satisfying, we'll continue.
e. Without me to consult you, you wouldn't be able to manage it.
f. With them on our side, we're safe.

In contrast, S1 of a CC cannot be nonfinite (Abeillé et al. 2006: 10), as shown in (6):

(6) a. *The more for me to read, the more I understand. (Abeillé and Borsley 2008: 1146)
b. *The cooler the weather getting, the happier Susie became.
c. *The cooler feeling, the happier Susie became.

Assume that, like many other languages, Mandarin Chinese also has the finiteness contrast (e.g., Li 1990, Zhang 2019, Huang 2024; contra Hu et al 2001). The examples in (7) (E 2014: 62) show that S1 of a CC cannot be nonfinite in Mandarin. In the unacceptable (7b), S1 is under the control verb *bi* 'force' and thus is nonfinite.

(7) a. 你越逼大衛學鋼琴, 他越逃避。
Nǐ yuè bī Dàwèi xué gāngqín, tā yuè táobì.
you more force David learn piano he more evade
'The more you force David to learn playing the piano, the more he evades.'
b. *你逼大衛越學鋼琴, 他越逃避。
Nǐ bī Dàwèi yuè xué gāngqín, tā yuè táobì.
you force David more learn piano he more evade
Intended: 'The more learning to play the piano you force David to do, the more he evades.'

Moreover, in Mandarin, the nominalizer *de* between a subject and a predicate nominalizes the clause, and the causative marker *bǎ* must be followed by a nominal. The string *tiānqì liángkuai* 'weather is cool', as seen in the underlined part of (8a), is

a clause (no copula is used for an AP predicate in the language; also see (1b)). In the absence of the nominalizer *de*, this clause cannot follow *bǎ*. If *de* occurs between the subject and the predicate of the clause in (8a), it nominalizes the clause and enables it to follow *bǎ*. Such a nominalized clause cannot be S1 of a CC, as seen in (8b).

(8) a. 他把天氣*(的)涼快歸因於昨天的暴雨。
Tā bǎ tiānqì*(-de) liángkuai guīyīn yú zuótiān de bào-yǔ
he BA weather-NOM cool attribute to yesterday DE heavy-rain
'He attributed the cool weather to yesterday's heavy rain.'

b. 天氣(*的)越涼快, 阿英越快樂。
Tiānqì(*-de) yuè liángkuai, Āyīng yuè kuàilè.
weather-NOM more cool Aying more happy
'The cooler the weather got, the happier Susie became.'

Furthermore, examples like (9a) do not show that S1 can be a nominal (cf. Liu 2008: 1035). My analysis of this example is given in (9b), where S1 is a copular clause, with a *pro* subject and a null copular, and the overt form is a post-copula nominal predicate.

(9) a. 越大的蘋果越好吃。
Yuè dà de píngguǒ yuè hàochī.
more big DE apple more delicious
'The bigger apple x is, the more delicious x is.'

b. [$_{S1}$ *pro* yuè BE dà de píngguǒ] [$_{S2}$ *pro* yuè hàochī]

With this finite restriction, S1 of a CC looks more like a root clause than a subordinate.

*Both may exhibit properties of non-root clauses*

The two clauses of a CC may both also exhibit properties of non-root clauses. First, a non-root clause cannot occur alone. This is true of both S1 and S2 of a CC (see (2)). One stipulation is that a functional head has an EPP-like feature, which requires S1 to occur in its Spec. This is mentioned in Abeillé and Borsley (2008: 1154). But it is not clear why only a clause can satisfy this feature, why both clauses must be finite, and why this functional head occurs in CCs only.

Second, in V2 languages, subordinate clauses are V-final, and one can find Dutch CCs in which both clauses are V-final (den Dikken 2003, 2005: 501). See (10).

(10) Des te meer je erover leest, des te minder je ervan begrijpt.
the-GEN TE more you about.it read the-GEN TE less you of.it understand
'the more you read about it, the less you understand of it.'

In this subsection, we have seen the inconsistency of both S1 and S2 of a CC with respect to its root or non-root status.

### The construction-specific formatives

In both S1 and S2 of a CC, there is a special use of a formative, and this use is not seen in other constructions. For example, in English, *the* is a definite article elsewhere, which precedes a nominal, but it precedes each of the two clauses of a CC. It cannot be replaced with another definite D-element, such as the demonstrative *this*. As pointed out by Quirk *et al* (1985: 1000), Fillmore et al (1988: 507), and McCawley (1988: 178), this is unique in the language. Den Dikken (2005: 510) treats this use of *the* as a Deg head, and Taylor (2013) treats it as a complementizer (a Force head in the C-domain). However, neither analysis explains why this special use of the article occurs in CCs only.

As in English, in Dutch, each of the two clauses of a CC also starts with a definite article-like expression *des te*.

(11) Des te meer je leest, des te minder begrijp je.
the.GEN TE more you read the.GEN TE less understand you
'The more you read, the less you understand.' (den Dikken 2005: 501)

In Egyptian Arabic, the expression *kull ma* occurs at the left edge of each clause of a CC, although the word *kull* 'every' should precede an NP in its normal use (Soltan 2020: 76).

(12) kull ma ti-ʔrā ʔaktar, (kull ma)
every COMP IPFV-read.2SGM more every COMP
ha-ti-fham ti-ʔrā.
FUT-IPFV-understand.2SGM more
'The more you read, the more you will understand.'

In Basque, the expression *gero eta* occurs in CCs only (Taylor 2013). In (13), it is simply glossed as CC (Taylor 2013: 130).

(13) Gero eta Jonek sagar gehiago bildu, gero eta pastel gehiago egiten
CC John-ERG apples more pick, CC pies more did
zituen bere amak.
AUX-TRNS-PAST his mom-ERG
'The more apples John picked, the more pies his mother baked.'

In Mandarin, *yue* 'pass over' is a transitive verb in general, which precedes an object, but it precedes a gradable predicate in a CC. It is glossed as "CC" directly in McCawley (1988) and as 'more' in Lin (2007). Again, this assumed degree adverb occurs in CCs only.

A noticeable exception is French (Abeillé et al 2006; Abeillé & Borsley 2008), in which no special formative is used in a CC, as seen in (14).

(14) a. Plus je lis, plus je comprends.
more I read more I understand
'The more I read, the more I understand.' (Abeillé & Borsley 2008: 1148)

b. Plus quelqu'un est grand, plus il a de grand pieds.
more somebody is tall more he has of big feet
'The taller somebody is, the bigger his feet are.'
(Beck 1997: 231)

The presence of CC-specific formatives in many languages and its absence in languages such as French have not been well-accounted for in the literature.

## The pairing of the formatives

The formatives in a CC addressed in 2.2 must occur in each of the two clauses. They must be either identical, as seen in the *the…the* pattern in English, or must match with each other, as seen in German and Polish. In a German CC, the formative *je* must occur with *desto*, and *desto* must occur with *je* (McCawley 1988). Thus, the *je…desto* pairing is unique to a CC.

(15) a. Je mild-er Otto ist, desto aggressiv-er ist er.
JE tired-CMPR Otto is DESTO aggressive-CMPR is he
'The more tired Otto is, the more aggressive'
(Beck 1997: 229)

b. Je früh-er man kauft, desto billig-er ist das.
JE early-CMPR one buys DESTO cheap-CMPR is it
'The earlier you buy, the cheaper it is.'

In Polish, *im…tym* is also a unique pairing to a CC:

(16) Im bardziej zmęczony jesteś, tym gorzej pracujesz.
IM more tired you-are TYM worse you-work
'The more tired you are, the worse you work.' (Borsley 2003: ex (6))

The ungrammatical English example in (17a) shows that the special use of *the* in a CC cannot be paired with another definite D-element, such as *this*. The ungrammatical Mandarin example in (17b) also shows that the special use of *yuè* in a CC cannot be paired with the normal degree adverb *gèng* 'more'.

(17) a. *The cooler the weather became, this happier Susie became.

b. *天氣越涼快, 阿英更快樂。
*Tiānqì yuè liángkuài, Āyīng gèng kuàilè.
weather more cool Aying more happy

Thus, there must be a fixed pairing between the two special formatives in a CC. The pairing of the formatives does not have any semantic effect, unlike the pairing of coordinators such as *et…et* 'and …and' in French and *both…and* in English. See

Zhang (2023: 25) for a review of research on such coordinator pairing. The formative pairing in CCs is also a puzzle that has not been well-explained in the literature.

I summarize the three puzzles of CCs in (18).

(18) a. The syntactic relation of the two clauses;
b. The special use of the formatives;
c. The pairing of the formatives.

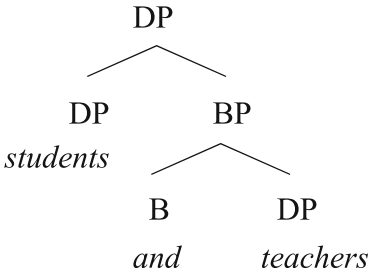
## Proposal

The unclear structural relation between the two clauses of a CC, seen in the puzzle reported in 2.1, leads me to seek a theory that covers two non-argument-taking relations: modification and coordination. I explore the possibility to use such a theory to understand the syntax of CCs.

### Theoretical background: a unified syntax of modification and coordination

One previous analysis of coordination is BP (Boolean Phrase) adjunction analysis. Munn (1992, 1993) proposes that BP contains the second conjunct and a coordinator, and it adjoins to the first conjunct, as illustrated in (19).

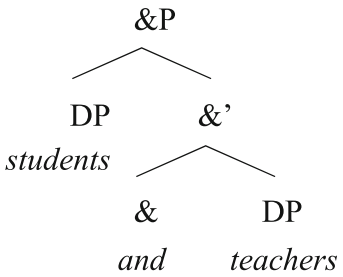
(19)




Boolean (or B) is a construction-specific functional category. But removing or reducing construction-specific syntax is one goal of generative syntax. Also, this BP is intrinsically an adjunct, unlike the projection of any other categories.

Another previous analysis of coordination is a Spec-Comp analysis, shown in (20).

(20)

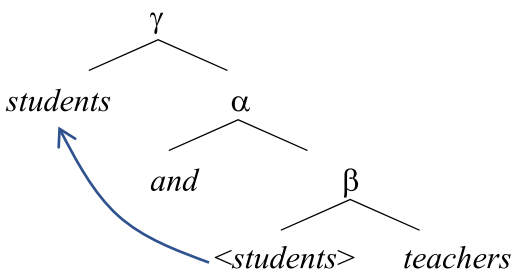



Thiersch (1985), Munn (1987), Kayne (1994), Zoerner (1995), and Johannessen (1998) assume that two conjuncts are Spec and complement of &P or CoP, respectively. This functional category is also coordinate construction-specific. One additional problem of this analysis is that since the assumed head has no syntactic category, not being able to provide the category features to the whole structure, Zoerner (1995: 20, 1999: 324) and Zhang (2010) assume that there is a feature percolation from a Spec to the whole complex. Although the Spec-Head dependency of other formal features has been recognized, e.g., phi-feature agreement, stipulating a Spec-Head dependency of the syntactic categorial features is ad hoc. Unvalued categorial features are never licensed by copying of such features from one element to another.

Den Dikken (2006) proposes a richer complementation structure, where the combination of *and* and the last conjunct is the complement of a silent coordinate construction-specific functional head, which is called J. But the problems mentioned above remain in this proposal.

One more available analysis of coordination is Chomsky's (2013: 46) sister movement analysis. The assumed derivation has three steps. (A) two conjuncts are merged; (B) the resultant structure is merged with a coordinator; and (C) the first conjunct moves to the left of the coordinator, as illustrated in (21).

(21)




In (21), after step (A), one of the two conjuncts must move out for β to be labeled. If *students* moves, β receives the label from *teachers*. Now, since *and* and the construction it heads (i.e., α) are not available as a label, γ receives the label from *students*. One problem here is that the combination of the two conjuncts must

be selected by a coordinator, and a coordinator must select such a combination. These are construction-specific operations. Another problem is that according to Chomsky's (2013 *et seq*.) labeling theory, if two sisters have the same category, the label of their combination should be that category and thus no one should move; but in (21), one sister must move. This analysis predicts either that **and students teachers* should be well-formed or that two conjuncts must always have different categories. Neither is true. See Zhang 2024 for critical comments on some other analyses of the structure of coordination.

From various aspects, Zhang (2023) argues for a unified syntax of modification and coordination. In Zhang (2010), a binary coordination has an external conjunct and an internal conjunct, and the former is structurally higher than the latter. Zhang (2023) further shows that both a modified element and an external conjunct decide the category of the whole construction; both satisfy the selection of a higher expression, and thus the other lexical item of the construction is syntactically optional; both modifiers and conjuncts can be stacked; and a conjunct may have the same reading as a modifier in certain constructions. The last point can be shown by (22) and (23). In (22a), the right conjunct *bought a cigar* can function as a purposive adverbial, parallel to the infinitive adverbial *to buy a cigar* in (22b) (Collin 1988: Part 3:6). In (23a), the left conjunct *they are rich* can function as a concessive adverbial, parallel to the *although* clause in (23b).

(22) a. I went to the store and bought a cigar. b. I went to the store to buy a cigar.

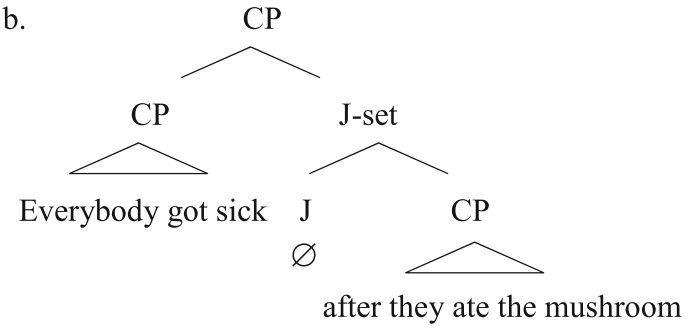
(23) a. They are rich and they still work hard. b. Although they are rich, they still work hard.

Zhang (2023) proposes that a modifier is the complement of a functional element Junct (J), and so is the internal conjunct of a coordinate construction. J takes a complement, like all other functional heads; but it has no category. J and its complement form a J-set, which also has no category, since a complement cannot label a structure. The merger of a J-set with the modified element in a modification construction and the merger of a J-set with the external conjunct in a coordinate construction are like the merger of a root with its categorizer. Also, the functional element J is realized as a coordinator or modification marker. Languages such as English do not have a modification marker, but some other languages do (e.g., Rubin 2003). Zhang (2023) also reports many shared properties of coordinators and modification markers.

According to this J-theory, the modification construction in (24a) has the structure in (24b); and the coordination construction in (25a) has the structure in (25b). The configurations of the two structures are the same.

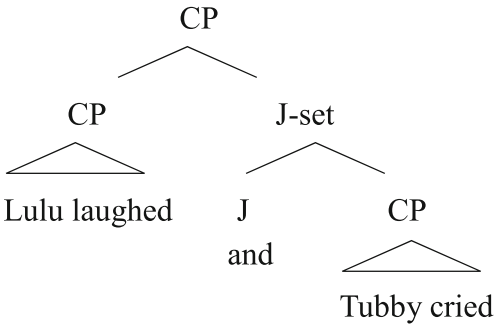
(24) a. Everybody got sick after they ate the mushroom.

b.




(25) a. Lulu laughed and Tubby cried.

b.




Both coordination and modification are non-argument-taking structures, and both need two basic levels of merger: J is merged with its complement, and the formed J-set is merged with its categorizer. In this theory, there is no pair merge or adjunction operation for modification, no relevant labeling issue,[5] and no coordination-specific syntactic categories and operations. The structures are built with available syntactic operations and primitives.

Regarding the linearization of the J-structure, in each merge level in (24b) and (25b), the surface order of the sisters does not affect the hierarchy of the relevant elements. According to Nichols (1986), when two elements have a morpho-syntactic dependency, the relation can be marked in various ways. (A) The marker can be hosted by one of the elements, either consistently the dependent element or consistently the other (called H by Nichols). In (26a), the marker *d* occurs with the modifier, and in (26b), the marker *i* occurs with the Head.

(26) a. $^{M}$d-ovxa $^{H}$xi [Chechen] b. $^{H}$kůh-$^{M}$i baland [Tadzhik]
hot water(d-) mountain high

[5] Also, "it is impossible for Move to target K raising α, then projecting α rather than K" (Chomsky 1995: 66; cf. Cecchetto & Donati 2015). Thus, there is no labeling issue in internal merge.

'hot water' 'high mountain'

(B) The marker appears between the two elements, regardless of their structural relation and the order. Such a marker is called a linker (L).

(27) a. nasa mesa-$^{M}$**ng** $^{H}$libro
on table-L book

b. $^{H}$libro$^{M}$-**ng** nasa mesa [Tagalog]
book-L on table

Both a and b: 'the book on the table'

Zhang (2023: 24) argues that when J is realized as the coordinator *and* and the modification marker *de* in Mandarin, its surface position follows strategy B. Thus, the morphological position of J does not correlate with the head-initial or head-final structure in syntax. (C) The marker is null. We know that languages such as English have no modification markers, and some coordinate constructions in various languages use no overt coordinators. (D) Double Marking (to be introduced in 4.3).

With this theoretical background, we are ready to explore the syntax of CCs.

### Shared properties between S1 of a CC and a Conditional Conjunct

S1 of a CC is called a conditional clause in Jespersen (1961: 5.382). In this subsection, I first introduce a special kind of conjunct that also encodes a condition, and then show some common properties of three types of condition-encoding clauses: this kind of conjunct, a left *if*-clause, and S1 of a CC, in contrast to the left conjunct of a symmetrical coordinate construction.

Consider the left conjunct in the following asymmetrical coordinate example.

(28) You drink another can of beer (Culicover & Jackendoff 1997: 197)
and I'm leaving.
Reading: If you drink another
can of beer, I'm leaving.

Such a construction is called a "left-subordinating *and*" construction in Culicover & Jackendoff (1997). They claim that the existence of such a construction shows a syntax-semantics mismatch. But to me, it shows a possible unification of coordination and subordination. From now on, I call the left conjunct in such a construction Conditional Conjunct.

There are two general contrasts that separate two groups of the left clauses of bi-clausal constructions: Group A contains S1 of a CC (the a-examples in (29) and (31)), a Conditional Conjunct (the b-examples in (29) and (31)), and a left *if*-clause (the c-examples in (29) and (31)); and Group B contains the left clausal conjuncts of symmetrical coordination (as in (30) and (32)). Note that, according to Culicover and Jackendoff (1997: 198), if the verb of the left clausal conjunct is not in a simple present tense, the conjunct does not have a conditional reading and thus it is not a Conditional Conjunct. Also, in this paper, I do not discuss *if*-clauses that follow the matrix clause.

The first contrast is that it is possible for a DP in the right clause to be the antecedent of a pronoun in the left clause (i.e., pronominalization from the right) in

Group A, but not in Group B. McCawley (1988: 177) notes this shared property of a left *if*-clause and S1 of a CC. Some of the following examples are from C&J (p. 561) and Langacker (1969: 162).

(29) a. The longer he$_1$ has to wait, the angrier John$_1$ gets.
b. Give it$_1$ fresh fish, and a cat$_1$ will love you forever.
c. If he$_1$ has to wait, John$_1$ gets angry.
(30) a. *She$_1$ sat at a table and the host offered some woman$_1$ drinks.
b. *Penelope cursed him$_1$ and slandered Peter$_1$.

The second contrast is that it is possible for a variable in the left clause to be bound by an element in the right clause (i.e., binding from the right) in Group A, but not in Group B. Some of the following examples are from C&J (p. 561).

(31) a. The more fish she$_1$ eats, the healthier every girl$_1$ gets.
b. Another picture of himself$_i$ appears in the news and
(Susan's afraid that) John$_i$
will get really angry.
c. If you give it$_1$ fresh fish, every cat$_1$, no matter how wild it is,
will love you forever.
(32) *You gave it$_i$ fresh fish and every cat$_1$ has been locked up.

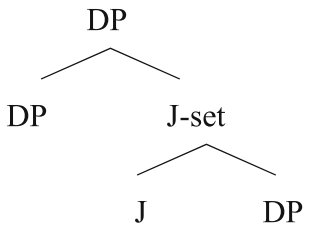
The dependencies in these two contrasts are established between elements that do not have a c-command relation, since each of the elements is contained in a clause.

In nominal coordination, based on the effects of the Condition C and Condition A effects of the Binding Principles, as shown in (33) and (34), the left conjunct is higher than the right one (Collins 1988: 2). Our right-branching structure in (35) reflects this contrast.

(33) a. John$_i$'s dog and he$_i$ went for a walk.
b. *He$_i$ and John$_i$'s dog went for a walk. (Cond. C violation)

(34) a. every dog$_i$ and his$_i$ owner
b. *his$_i$ owner and every dog$_i$ (Cond. A violation)

(35)



From the hierarchy (but not the linear order) perspective, the binding patterns in the nominal coordinate constructions indicate that a variable may not c-command its binder, and a pronoun may not c-command its antecedent.

Now consider parasitic gap constructions. In such constructions, the gap in the low clause depends on the gap in the high clause: it is interpreted as a variable bound by the other gap and it can be in the form of an overt pronoun. But the parasitic direction is fixed: the parasitic one cannot be in the high clause. Importantly, the gap in the high clause comes from the movement of a DP from the high clause, so that it can c-command the lower gap in the low clause. (36a) has the structure in (36b).

(36) a. Who did [John kiss _ ][without looking at _ ].
b. $\text{Who}_i$ did [John kiss $<\text{who}_i>$][without looking at $pro_i$]

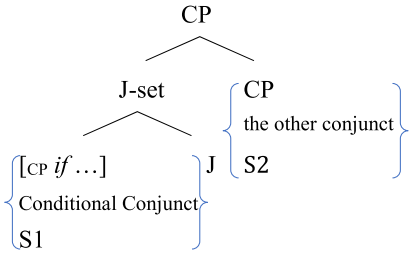
In the J-theory, the clause that contains a parasitic gap is in the position of a modifier, i.e., the complement of J, and the matrix clause is the sister of the J-set.

Likewise, in the modification construction in (37) (Hornstein & Weinberg 1990), the anaphoric epithet *the bastard* in the adverbial is bound by *every senator* after the latter is raised at LF.

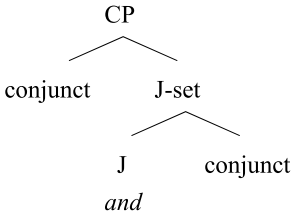
(37) John criticized every $\text{senator}_i$ in private while praising the $\text{bastard}_i$ in public.

The associated gaps in the two clauses of the parasitic gap construction in (36a) and the binding in the epithet construction in (37) are parallel to the associated DPs in the two clauses of our bi-clause constructions. I thus distinguish two structures, and in both structures one clause is higher than the other one, as in a parasitic gap construction. I propose that the two groups of the bi-clause constructions have the following structures:

(38) a. Group A




b. Group B




In (38a), the left clause is structurally lower than the right one, whereas in (38b), the right clause is structurally lower than the left one. Let us see how the proposed structures explain the binding and pronominalization contrasts between the two groups. In (38a), if a DP in the high clause (i.e., the right one) moves out of the construction at LF, it c-commands the associated DP in the low clause, regardless of whether the latter is a pronoun or a variable. In this case, the basic hierarchy requirement of the Binding Principles is obeyed. In (38b), however, if a DP in the high clause (i.e., the left one) moves out of the construction at LF, it c-commands

the associated DP in the low clause. If the moving DP is a pronoun or a variable and the associated DP in the low clause is the antecedent of the pronoun or the binder of the variable, the result violates the basic hierarchy requirement of the Binding Principles. Therefore, (38a) does, but (38b) does not, allow backward pronominalization from the right and the binding from the right.

(38b) and (35) have the same configuration: a right-branching one. The unacceptable examples in (30) and (32) parallel the unacceptable examples in (33b) and (34b).

Also, in the proposed structures in (38), J is realized as a coordinator in a coordinate construction, but not in an *if*-construction and a CC. Moreover, in (38a), if J is realized by *and*, which is a proclitic, the morphological grouping is different from the syntactic constituency: *and* is always grouped with the conjunct to its right morphologically, but it is grouped with the conjunct to its left syntactically in (38a).

Group B clausal coordination includes both symmetrical coordination and the construction in which the right conjunct has an adverbial reading. The two conjuncts are symmetrical in Reading A, but not in Reading B of (39). The latter reading is synonymous to the right-modifier construction in (40). In both (39) in its reading B and (40), the right clause is the complement of J, lower than the left clause.

(39) David$_i$ went to the store and he$_i$ bought a cigar.
Reading A: two independent events.
Reading B: 'David$_i$ went to the store so he$_i$ bought a cigar there.'
(40) David went to the store to buy a cigar.

In conclusion, the contrasts between Group A and Group B constructions can be explained by the contrast that in the former, the left clause is the complement of J and the right one is the sister of the J-set, and in the latter, the right clause is the complement of J and the left one is the sister of the J-set.

Recall that in every level of the J-structure, the order of the two elements is irrelevant to the hierarchical position of the elements (3.1). The order of the two clauses of a CC should not affect their structural relation. Nevertheless, German allows S2 to precede S1, as seen in (41) (Beck 1997: 238), but Mandarin does not. Thus, the ungrammaticality of (42a) (Hsiao & Tsao 2002:820–822; Liu 2008: 1040) simply comes from the order of the two clauses. My analysis of this example is given in (42b). The intended meaning should be expressed in (42c). This cross-linguistic contrast does not affect the relation that S1 is lower than S2 in a CC.

(41) Meistens war Otto umso mider, je heißer es war.
mostly was Otto UMSO tired-er JE hotter it was
'The hotter it was, the more tired Otto usually was.'

(42) a. *張三越喜歡, 越貴的東西。

| | | | | | |
|---|---|---|---|---|---|
| *Zhāngsān | yuè | xǐhuān, | yuè | guì-de | dōngxī. |
| Zhangsan | more | like | more | expensive-DE | thing |

b. *[$_{S2}$ Zhāngsān yuè xǐhuān *pro*][$_{S1}$ *pro* yuè BE guì de dōngxī]

c. [$_{S1}$ *pro* yuè BE guì de dōngxī] [$_{S2}$ Zhāngsān yuè xǐhuān *pro*]

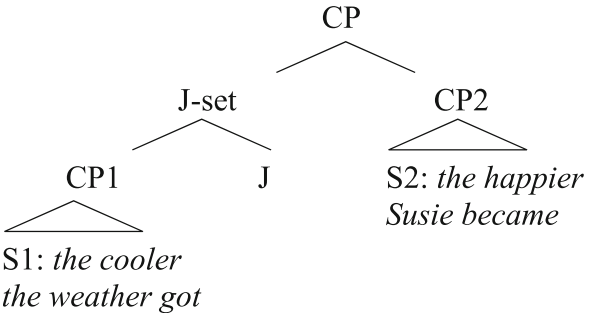
I conclude that like a left *if*-clause and a Conditional Conjunct, S1 of a CC is the complement of J, which is a functional element in both coordinate and modification constructions.

### The structures *of complex* CCs

In this subsection, I discuss CC embedding constructions. I have argued that a CC has the structure of (38a), where S1 is the complement of J and the formed J-set is merged with S2. The structure of (43a) is (43b).

(43) a. The cooler the weather got, the happier Susie became.

b.



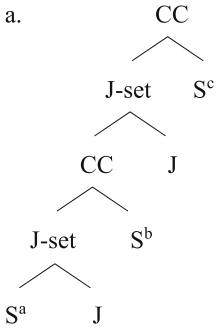

CCs allow embedding. If more than two clauses occur, sub-grouping of two consecutive clauses is necessary. Consider (44) (I thank multiple native speakers for discussing this example with me; cf. den Dikken 2005: 503). Let's call the three clauses in such an example $S^a$, $S^b$, and $S^c$, respectively, from left to right.

(44) a. The more you eat, the fatter you get, the sooner you die.
b. The more you eat and the fatter you get, the sooner you die.
c. The more you eat, the fatter you get and the sooner you die.

In (44a), $S^a$ and $S^b$ form a CC, that is S1 of the matrix CC, in which $S^c$ is S2. In (44b), $S^a$ and $S^b$ form a symmetrical coordinate complex, and this complex is S1, and $S^c$ is S2 of the unique CC. In this case, the situation of dying sooner correlates with the combination of too much eating and fatness. In (44c), $S^a$ is S1 of a unique

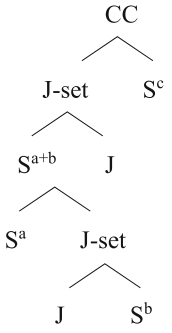
CC, where the combination of $S^b$ and $S^c$ is S2. In this case, too much eating causes the combined effect: fatness and early death. The basic structures of (44a), (44b) and (44c) are (45a), (45b), (45c), respectively.

(45) a.



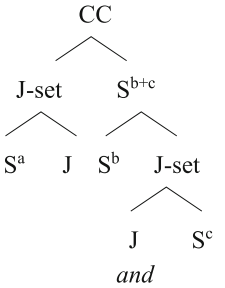

*and*

b.




*and*

c.




*and*

Now consider Mandarin examples. (46a) (from E 2014: 178) also contains three clauses. The amount of money that I spend does not come from the combination of hot weather and a high electricity fee. Rather, it comes from the latter alone. The high fee in turn comes from my additional uses of the cooling device, because of the hotness of the weather. Thus, the first two clauses form a CC, that is S1 of a matrix CC, in which the last clause is S2. So, this CC example has an embedded CC. Its structure is like that in (45a). The example is synonymous with (46b), where *jiù* 'then' precedes both the second and the third clauses, marking the embedded S2 and the matrix S2, respectively.

(46) a. 天氣越熱,電費越高,我的開銷越大。

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Tiānqì | yuè | rè, | diàn-fèi | yuè | gāo, | wǒde | kāixiāo |
| weather | more | hot, | electricity-fee | more | high, | my | expense |
| yuè | dà. | | | | | | |
| more | big. | | | | | | |

b. 天氣越熱,電費就越高,我的開銷就越大。

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Tiānqì | yuè | rè, | diàn-fèi | jiù yuè | gāo, | wǒde | kāixiāo |
| weather | more | hot, | electricity-fee | then more | high, | my | expense |
| jiù | yuè | dà. | | | | | |
| THEN | more | big. | | | | | |

Both: 'The hotter the weather is, the higher the electricity fee is, the more I spend.'

These constructions do not change the basic structure of a CC: it is still as in (43b).

The conclusion of this section is that S1 of a CC and a Conditional Conjunct are in the same syntactic position, although unlike in a coordinate construction, no coordinator occurs in a CC.

## Unraveling the three puzzles

### Unraveling the structural puzzle

The first syntactic puzzle of CCs reported in Sect. 2.1 is the syntactic structural relation between the two clauses of a CC.

*The inconsistent root status of the clauses of a CC*

One fact seen in Sect. 2.1 is that both clauses of a CC must be finite. The same constraint is seen on Conditional Conjuncts, as seen in (47).

(47) *Drinking another can of beer and I'm leaving.

In fact, conjuncts are in the same finiteness in general. Another fact seen in Sect. 2.1 is that it is possible for the two clauses of a Dutch CC to be both V-final, another case of the form similarity of the clauses of a CC. These two facts are compatible with our analysis that CCs behave the same as one kind of coordinate construction. It is generally assumed that compared to other complex constructions, the lexical components of a coordinate construction (i.e., conjuncts) exhibit a higher-level of parallelism (cf. Chomsky's 1957 Coordination of Likes Constraint; see Zhang 2010: 178–181 for a discussion).

But the two ways of form similarity in CCs mentioned above are contradictory with respect to the rootness status of a clause: only root clauses disallow non-finite forms, and only non-root clauses allow V-final in V2 languages. CCs may have both properties.

On the one hand, the possible conditional reading of S1 leads many scholars to believe that S1 is subordinate to S2. On the other hand, S2 also depends on S1, unlike a canonical root clause. Descriptively, S2 is licensed by S1. In semantics, the two clauses of a CC are two arguments of an abstract quantifier (Beck 1997). In Beck (1997: 237; also Lin 2007), S1 is the restriction and S2 is the nuclear scope of a degree quantification. Therefore, the two clauses of a CC are mutually dependent on each other.

Some scholars have tried to find out the morphosyntactic representation for this mutual dependency. For example, Dikken (2005) gives a correlative relative analysis of CCs. Correlative relative constructions are found in languages such as Hindi. (48) is an example.

(48) [$_{IP}$ [$_{CP}$Jo larRkii khaRii hai] [$_{IP}$ vo lambii hai]] [Hindi]
REL girl standing is DEM tall is
'The girl that is standing is tall.'
Lit.: 'Which girl is standing, that (one) is tall.' (den Dikken 2005: 499)

In this construction, the relative clause is not next to the nominal it modifies, but rather precedes the matrix clause, and the matrix clause must contain a demonstrative, which is a correlative marker. The basic structure of the construction is (49) (cf. den Dikken 2005: 499).

(49) [$_{\text{Matrix Clause}}$ [$_{\text{Rel. Clause}}$ …] [$_{\text{Matrix Clause}}$ DEM ... ]]

One important property of the construction is that the demonstrative makes the containing clause be dependent on the preceding relative clause; and thus, unlike a normal relative clause, a correlative relative clause is obligatory in the construction. Den Dikken (2005) links S1 and S2 of a CC to the correlative relative clause and its hosting matrix clause, respectively. He also tries to identify the counterpart of the demonstrative in (49) in a CC (see our 4.1.3).

Lin (1997) uses the formative *jiu* 'then' in a Mandarin CC to represent the mutual dependency of the two clauses. In this language, S2 of a CC allows the word *jiù* 'then'. One example is (50) (also see (46b)).

(50) 天氣越涼快, 阿英(就)越快樂。
Tiānqì yuè liángkuài, Āyīng (jiù) yuè kuàilè.
weather more cool Aying then more happy
'The cooler the weather got, the happier Susie became.'

According to Lin (2007: 192), "*jiù* in Chinese comparative correlatives links the degree arguments in the first and second clauses through a relation R from which the causation meaning is derived." He also specifies that the R relation is a corresponding or resulting relation (p. 193). In the absence of such a relation between two clauses, *jiù* cannot occur, as seen in (51).

(51) 天氣很涼快, 風景(*就)也很漂亮。
Tiānqì hěn liángkuai, fēngjǐng (*jiù) yě hěn piàoliang.
weather very cool scenery then also very beautiful
'The weather is cool and the scenery is also beautiful.'

In this sense, *jiù* in S2 of a CC is like the demonstrative in the matrix clause that hosts a correlative relative, and thus it is a correlative marker. This use of *jiù* is not semantically associated with any element in the local predication (see Hole 2004 for the uses of *jiù* in single clause constructions). Instead, it is associated with the preceding clause. The possible occurrence of this *jiù* makes the containing clause be dependent on the preceding clause. In a CC, S2 depends on S1. As stated by Reviewer 1 of this paper, "In fact, not only would a comparative correlative construction lacking S1 be pragmatically incomplete, it would also fail syntactically

on account of not being a correlative (the correlative particle in S2 does not have an associate if S1 is absent)."

The same analysis applies to conditional constructions. The word *jiù* occurs in the matrix clause of such constructions in Mandarin (McCawley 1988: 181; Lin 2007: 189), seen in (52).

(52) 如果天氣涼快, 阿英*(就)快樂。
Rúguǒ tiānqì liángkuai, Āyīng *(jiù) kuàilè.
if weather cool Aying then happy
'If the weather is cool, Aying is happy.'

In this perspective, the occurrence of this correlative marker marks the relational status of the containing clause. In other words, a clause exhibiting R in Lin's (2007) sense is a relational clause. The matrix clause of a correlative relative construction, S2 of a CC, and the matrix clause of a conditional adverbial construction are all relational clauses. Just like a relational noun, which is licensed by another nominal, a relational clause is licensed by another clause.

Recall that in Sect. 3, I have argued that S1 of a CC and a conditional adverbial clause have the same syntactic position, in addition to their similar semantics. Identifying *jiù* in both constructions as a correlative marker explains the dependency of S2 on S1 in a CC, and the dependency of a consequence clause on its conditional.

In the J theory, if S1 is the complement of J and S2 is the categorizer of the J-set, S1 depends on S2; however, if S2 is a relational clause and is licensed by S1, it depends on S1. Therefore, the two clauses of a CC are dependent on each other. Thus, neither of them is a typical root clause, taking the other clause as its subordinate, and neither of them is typically subordinate to the other clause, in the absence of a subordinator (e.g. *if*). The inconsistency in the rootness properties reported in 2.1 is thus not a surprise.

### *The syntactic licensing of S2*

In this subsection, we report that S2 of a CC must be licensed in a syntactic context, unlike other relational expressions.

Relational expressions need their licensors. For example, the relational noun *capital* is licensed by *Japan* in either the DP *Japan's capital* or the DP *the capital of Japan*. A relational noun can also be licensed in the discourse context. In (53), *capital* is licensed in the context where the identity of a certain country is obvious.

(53) The capital has a lot of foreigners.

A conditional adverbial licenses the matrix consequence clause. In Mandarin, the licensing can be accomplished in the discourse context. In (54), the conditional uttered by Speaker A licenses Speaker B's answer, which is relational, marked by *jiù*.

(54) A: 如果他大選輸了呢? B: 他就會去教書。
A. Rúguǒ tā dàxuǎn shū-le ne? B: Tā jiù huì qù jiāoshū.
if he election fail-PRF Q he then will go teach
'What if he loses the election?' 'He will go to teach.'

Moreover, in English, if a conjunct contains *too*, it needs a previous clause or a context to convey some parallel information (Kripke 2009). The word *too* marks the relational status of the containing clause. In (55a), it is the left conjunct that licenses the relational clause, and in the fragment sentence in (55b), it is the discourse context that does so.

(55) a. Mary is guilty, and (I believe) Bill is guilty, too.
b. Me, too.

In (55a) the two conjuncts are symmetrical semantically, and thus the construction belongs to Group B discussed in 3.2.

As we concluded in the previous subsection, in a CC, S2 is licensed by S1. But the licensing cannot be accomplished in the discourse. In (56), the clause uttered by Speaker A cannot license Speaker B's answer.

(56) A: *天氣越涼快呢? B: *阿英就越快樂。
*Tiānqì yuè liángkuai ne? B: *Āyīng jiù yuè kuàilè.
weather more cool Q Aying then more happy

It is not clear to me yet how to explain this contrast between S2 of a CC and other kinds of relational clauses. I leave an account of this observation to future research.

*The occurrence of a correlative marker*

In this subsection, we address the issue of the occurrence of a correlative marker in Mandarin CCs but not in English CCs.

A correlative marker signals the relational clause status of the hosting clause. It is an anaphoric proform, taking another clause as its binder. We have seen that S2 of a CC in Mandarin may have the correlative marker *jiù*. In a coordinate construction, the J element (i.e., a coordinator) is not a correlative marker, since it is not a proform that takes a clause as its binder. Thus, a coordinator and a correlative marker are different, and neither is a variant of the other. Assume that the counterpart of the Mandarin correlative marker *jiù* is the word *then* in English. Both *jiù* and *then* can be an anaphoric proform, taking a clause as its binder. The word *then* may occur with a coordinator, as seen in (57a). In this construction, the right conjunct is a relational clause, marked by *then* and licensed by the left conjunct. The word *too* in (57b) is also a correlative marker (see 4.1.3), and the right conjunct there is licensed by the left conjunct in the same way.

(57) a. John ate the mushroom and then he fell ill.
b. Mary is guilty, and Bill is guilty, too.

In Mandarin, as mentioned above, the correlative marker *jiù* occurs in S2 of a CC and in the matrix clause that follows a conditional adverbial. In English, the word *then* is allowed or optional in the clause that follows an *if*-clause, as seen in (58a), but it does not occur in a CC, as seen in (58b) (McCawley 1988: 186). In the absence of a correlative marker, the corresponding or resulting relation between the two clauses of a CC in English must be identified by the semantic relation of the two clauses.

(58) a. If you eat ice cream, (then) you will get fat.
b. The louder you talk, (*then) the less people listen.

There can be some interactions between the presence of a correlative marker (the counterpart of *then* in the language) and the syntactic context. For example, in Dutch, if a conditional has the reversed order of a verb and its subject, in the absence of *als* 'if', then the word *dan* 'then' is obligatory.

(59) a. Als je komt, (dan) bak ik pannekoeken.
if you come then bake I pancakes
'If you come, (then) I bake pancakes.'
b. Kom je, *(dan) bak ik pannekoeken. (den Dikken 2005: 498)

The contrast between (59a) and (59b) is not semantic. The fact is that the obligatory presence of *dan* correlates with the disallowance of *als* in the inversion version of a conditional in Dutch, and the rejection of *then* in (58b) correlates with the disallowance of *if* in a CC in English. The position of both the raised verb in (59b) and *if* is C. Both the obligatory presence and the obligatory absence of a correlative marker in these constructions seem to be related to the syntactic occurrence of the conditional marker in these languages (but not in Mandarin), or the syntax of the C-domain of the constructions in general. In 4.2, we will see that the special use of *the* interacts with the syntax of the C-domain in English CCs.

Den Dikken & Dékány (2022) discuss another construction that rejects the correlative marker *then*: depictive constructions (e.g., *she (*only then/thus) considers John attractive nude*). The rejection is also not semantic. They claim that the rejection may be caused by the absence of a CP for a depictive. To my mind, a possible account for the occurrence of *then* is that this element needs to agree with a certain feature in the C-domain. It might be the feature that allows a head movement to ForceP (see (65) later). The C-domain for a CC does not have this feature, and a depictive has no CP to host this feature. Thus, *then* is not allowed in

[6] In den Dikken (2005: 499), it is the special formative *the* in S2 (but not in S1), that is assumed to be a correlative marker in a CC; and then the exclusion of another correlative marker, *then,* seems to be explained. But the correlative marker *jiù* 'the' may occur with the special formative *yue* in Mandarin CCs. Moreover, *jiu* also occurs in conditional constructions. In English conditional constructions, it is *then,* not *the,* that occurs (see (58a)). If *the* were a correlative marker in a CC, one would need to explain why this use is never seen in other constructions.

either construction.[6] I leave for future research these differences in the occurrence of a correlative marker in different languages.

I conclude that whether a relational expression has a formal marker is independent of the structural position of the relational expression. Therefore, the absence of a correlative marker in an English CC does not affect the structure of the construction.

In this subsection, I have shown four points. First, the finite restriction on both clauses of a CC because they behave like two conjuncts. Second, S2 is a relational clause, and the relational property can be overtly marked by *jiù* in Mandarin. It is this relational property that makes S2 depend on S1, although S2 is structurally higher than S1. The mutual dependency captures the inconsistent root or non-root status of the two clauses. Third, unlike other relational expressions, S2 of a CC must be licensed by S1 syntactically. Fourth, the absence of an overt correlative marker in a CC does not affect the structural relation between the two clauses.

In the following two subsections, I explain the formative puzzles of CCs reported in Sect. 2.

### Unraveling the construction-specific formative puzzle

The second puzzle reported in Sect. 2.2 is why the use of certain formatives is found in CCs only, e.g., the clause-initial fake article *the* in English and the predicate-initial *yue* 'more' in Mandarin.

Recall the fact that no such special formatives occur in a French CC, as seen in (60a). Importantly, Abeillé et al (2006) and Abeillé & Borsley 2008 report that between the two clauses of a CC in French, the conjunction *et* 'and' may occur for some speakers, as in (60b). We can assume that in (60a), the coordinator takes a null form.

(60) a. Plus je lis, plus je comprends.
more I read more I understand
b. Plus je lis et plus je comprends.
more I read and more I understand
Both: 'The more I read, the more I understand.' (Abeillé & Borsley 2008: 1153)

In English, no conjunction may occur between the two clauses of a CC:

(61) The more I read, (*and) the more I understand.

Similarly, in Mandarin, no conjunction may occur between the two clauses of a CC, as seen in (62).

(62) 你越紧張, (*而且)他越不能專心。
Nǐ yuè jǐnzhāng, (*érqiě) tā yuè bù néng zhuānxīn.
you more nervous and he more not can concentrate
'The more nervous you are, the less he can concentrate.' (E 2014: 74)

In Spanish and Italian, a CC has two versions: one is with a conjunction, such as *y* 'and' in (63a) and *e* 'and' in (64a), and the other is with a pair of special formatives, such as *cuanto…tanto* 'how-much…that-much' in (63b) and *quanto… tanto* 'how-much…that-much' in (64b) (Abeillé et al 2006: 6). Since the presence or absence of these apparent quantifiers does not affect the interpretations, they are fake quantifiers. Such CC-specific fake quantifiers are treated as modifiers or specifiers of comparatives in Abeillé et al (2006: 14-15).

(63) a. Más leo (y) más entiendo. [Spanish]
more read.1SG and more understand.1SG
b. Cuanto más leo, (tanto) más entiendo.
how-much more read.1SG that-much more understand.1SG
Both: 'The more I read, the more I understand'

(64) a. Più leggo (e) più capisco. [Italian]
more read.1SG and more understand.1SG
b. Quanto più leggo, (tanto) più capisco.
how-much more read.1SG that-much more understand.1SG
Both: 'The more I read, the more I understand'

Some non-standard varieties of French (Abeillé et al 2006: 10, fn. 1) and Belgium French (Abeillé & Borsley 2008: 1148, fn. 11) also have a special formative version of CCs.

What we have seen in the data in this subsection is that if a pair of special formatives occurs in a CC, no conjunction is allowed; and in the absence of such formatives, a conjunction may occur in a CC in some Romance languages. Thus, there is a complementary distribution between the special formatives and conjunctions in CCs. A conjunction realizes J (3.1). Plausibly, in a CC, there are two possibilities for the realizations of J: as a conjunction, as in French and one version of Spanish and Italian CCs, and as a pair of special formatives; and in the latter case, a special formative contains a J element and some other morpheme.

What is the other morpheme that is an ingredient of the special formative in a CC? As discussed by Taylor (2013), the *the* in CCs in English exhibits some formal properties of a functional head in the C-domain. She observed that, like a complementizer, this *the* blocks the subject-Aux inversion. For example, if (65a) is the base sentence for a *who*-question, neither (65b) nor (65c) is possible, "regardless of whether we try and construe the Tense to have originated in the first or second clause, respectively." (Taylor 2013: 125) She shows that the movement of *who* is not a problem here, since the long-distance extraction example in (65d) shows that if the whole CC is embedded under *think*, the expression is fine.

(65) a. The more Mary gives gifts to Bill, the happier he is.
b. *Who$_1$ does the more Mary give gifts to $t_1$, the happier he becomes?
c. *Who$_1$ does the more Mary gives gifts to $t_1$, the happier he become?

d. Who$_1$ do you think that the more Mary gives gifts to $t_1$, the happier he is?

If the clause-initial *the* interacts with the syntax of the C-domain, it is possible for it to be a portmanteau of a J element and a C element in a CC. In its presence, a coordinator, which is also a J element, cannot occur, as seen in (61).

In Mandarin, *yuè* rejects any degree word in a CC, which is a comparative degree construction, as shown in (66) (Lin 2007: 184). It is thus possible for *yuè* in a CC to be a portmanteau of a J element and a degree element.

(66) 蘋果越{*很/*更/*比較}大, . . .
Píngguǒ yuè {*hěn/*gèng/*bǐjiào} dà, …
apple more very/more/more big
Lit. 'The bigger an apple is (than another one which is also big), . . . '

In Mandarin, the comparative (CMPR) morpheme is null, and thus there is no counterpart of *-er* or *more* in the comparative form of a gradable expression. This is shown in (67):

(67) 阿英比克非$\varnothing_{\text{CMPR}}$快樂。
Āyīng bǐ Kèfēi $\varnothing_{\text{CMPR}}$ kuàilè.
Aying than Kefei happy
'Aying is happier than Kefei.'

Thus, more specifically, it is possible for *yuè* in a CC to be a portmanteau of a J element and a comparative degree element. The construction also rejects a coordinator, as seen in (62).

The special formatives in CCs do not occur in other constructions because they are portmanteaux of J and another morpheme, not seen in the constructions where J does not occur or is realized as a conjunction, such as (60b), (63a), and (64a).

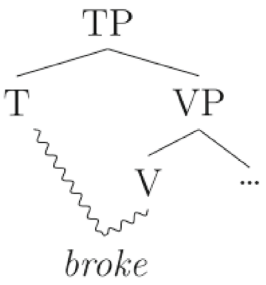
This portmanteau account of the special formatives in CCs is independent of the choice of theories on portmanteaux. Nevertheless, I adopt Svenonius's (2012, *et seq*.) Spanning theory.

In the traditional generative grammar, some words are believed to be formed by head movement, including downward head movement (e.g., the so-called affix hopping, a morphological operation by which an affix in the T position is lowered onto a verb). "This requires syntax-like operations to occur after lexical insertion, violating parsimony and Occam's Razor" (Svenonius 2023: 7). In the Spanning theory, a single word can spell out the elements from more than one syntactic node in the same complementation line (Svenonius 2021, 2023). For example, the English word *broke* contains both a past tense morpheme, which is a T element, and a V element. The spanning is illustrated in (68a). The form *du* in the French expression *du chat* 'of the cat' contains both the P element *de*, and the definite masculine D element *le*. The spanning is illustrated in (65b).[7] More portmanteau and thus

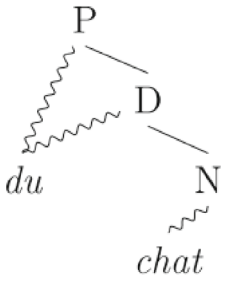
[7] In Distributed Morphology, to derive the form in (65b), P attaches to D by a postsyntactic P-to-D lowering rule (Embick 2007).

spanning examples can include *bié* (= *bù* 'not' + *yào* 'should'), *liă* (= *liăng* 'two' + *gè* 'CL') in Mandarin. These words do not have to and usually are not syntactic constituents.

(68) a.




b.



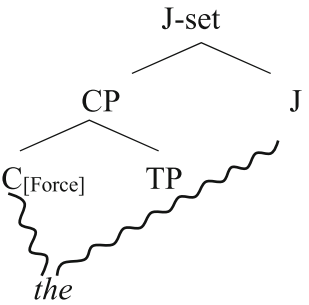

A J element and other kinds of elements can also be realized as a single word. This is seen in the Albanian disjunctive example in (69) (Dalina Kallulli, *p. c.*). In this example, each disjunct is preceded by *daç,* which encodes a disjunctive relation, an optative mood, an agreement, and a verb, altogether.

(69) *Shkojmë* *në* *kinema* *daç* *sot* *daç* *nesër*.
go.1PL.IND in cinema want.2S.OPT today want.2S.OPT tomorrow
'We can go to the movies either today or tomorrow (whatever suits you)'

Such a spanning obeys locality: the lexical insertion for a portmanteau occurs in a single cycle. For example, *du* for P and D in (65b) occurs after the lexicalization of the following NP *chat*, which is a separate word. In our (69), if the disjunction (as a J element) takes the internal disjunct as its complement, all the elements encoded by *daç* are in the same complementation sequence. "With span-based lexical insertion, the primary need for bringing heads together through head movement vanishes—the heads in a span are already local to each other." (Svenonius 2023: 9) Also, in (69), the J element has no category and thus it is unable to move. The head movement analysis does not apply. In the same paper, Svenonius argues for different linearization positions of a verb in a complementation line, in French, English, and German. Basically, spans are recognized by the grammar. Lexical insertion targets spans of complementation sequences (Svenonius 2012: 14).

I use this theory to understand the formation of the special formatives in CCs. In the J-set of a CC in English, for instance, *the* linearizes J and the $C_{[Force]}$ of S1, as illustrated in (70) (A similar spanning occurs in S2, to be discussed in 4.3).

(70)




If a construction has no J, such a special formative does not occur. Likewise, the special disjunctive *daç* in Albanian does not occur, if a disjunction is not grouped with a modal, an agreement, and a verb. In the absence of these verbal elements, a disjunction is just *apo* (and its reduced version *a*) or *ose* (and its reduced version *o*), as seen in (71) (Dalina Kallulli, *p. c.*).

(71) a. mirë {apo/ose} keq b. sot {a/o} nesër
good or bad today or tomorrow

The position of such a portmanteau in a CC is either at the left edge of a CP, or in the complementation line (or called clause spine) inside a clause, as seen in the position of *yuè* 'more' in Mandarin in (73a), and the second *des-te* in the Dutch example in (72) (den Dikken 2005: 501, fn. 5; Abeillé & Borsley 2008: 1148, 1154). The portmanteau does not occur internally to an argument of the verb of the clause, as predicted by the span theory (see Svenonius 2023: 9). In the unacceptable (73b), *yuè* illegally appears inside the object *nà zhī xiǎo gǒu* 'that small dog'.

(72) Des te meer je leest, je begrijpt des te minder.
the.GEN TE more you read, you understand the.GEN TE less
'The more you read the less you understand.'

(73) a. 阿里越喜歡那隻小狗，…
Ālǐ yuè xǐhuān nà-zhī xiǎo gǒu, …
Ali more like that-CL small dog
'The more Ali likes that small dog, …
b. *阿里喜歡那隻越小狗，…
*Ālǐ xǐhuān nà-zhī yuè xiǎo gǒu, …
Ali like that-CL more small dog

When the special formative occurs inside one clause of a CC, the portmanteau is not formed by any (downward) head movement of J, which, as a categoryless element, cannot move.

I conclude that if we recognize J, the occurrence of the special formatives in a CC is explained by their portmanteau status: they represent both J and another element.

## Unravelling the formative pairing puzzle

The third puzzle of CCs reported in 2.3 is why the CC-specific formatives occur in pairs, appearing in both clauses.[8] My answer is that they come from the Double Marking of the same J element, a morphological strategy that is also seen in other constructions (Strategy D; see 3.1).

One example of Double Marking is the Turkish example in (74) (Nichols 1986: 65). In this example, the Head element *kapi* 'door' is marked with the third person singular suffix *si*, and the dependent element *ev* 'house' is marked with the genitive case marker *in*.

(74) ev-in kapi-si [Turkish]
house-GEN door-3SG
'the door of the house'

If the dependency between two elements is semantically clear, the zero marking strategy is possible, and thus even one overt dependency marker is redundant, and Double Marking is more redundant. Thus, Double Marking is not semantically oriented.

The surface positions of some kinds of coordinators may appear following the Double Marking strategy. In (75a), both disjuncts obligatorily host the disjunction *yàome* 'or'; and in (75b), both conjuncts obligatorily host the conjunction *yībiān* 'and'.

(75) a. 克非要麼在看電影, 要麼在逛街。
Kèfēi yàome zài kàn diànyǐng, yàome zài guàng jiē.
Kefei or PRG see movie or PRG stroll street
'Kefei is either seeing a movie or strolling on a street.'
b. 克非一邊在逛街, 一邊在看電影。
Kèfēi yībiān zài guàng jiē, yībiān zài kàn diànyǐng.
Kefei and PRG stroll street and PRG see movie
'Kefei is strolling on a street and seeing a movie at the same time.'

If the additional coordinator-like element is optional, the construction may have a different reading from its correlated single coordinator construction (e.g., the *et* ... *et* 'and … and' construction in French). In this case, the apparent coordinator at the left-edge can be a focus marker (Zhang 2023: 25, and the references therein). If two

[8] The *yuè* pair is also found in the idiomatic expression *yuè-lái-yuè* 'more and more', as used in (i). In this expression, *lái* 'come' cannot be replaced with any other word, including *qù* 'go' (**yuè-qù-yuè*). Also, as in a CC, *yuè* encodes a degree meaning. I do not discuss this idiomatic expression in this paper.

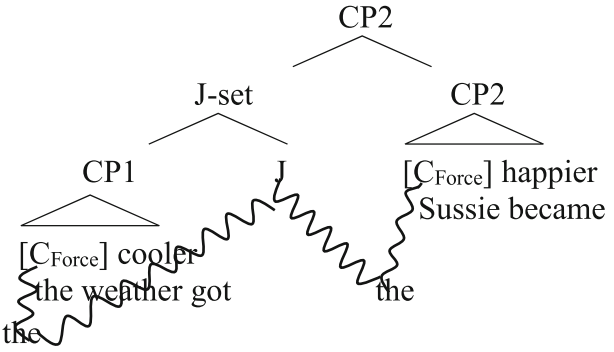
(i) Tiānqìyuè lái-yuè rè-le. 天氣越來越熱了。
weather more-come-more hot-PRF
'The weather is getting hotter.'

coordinators must co-occur, as in (75a) and (75b), there is no corresponding single coordinator construction, and thus neither of the two formatives is a focus marker.[9] Instead, the two occurrences of *yàome* 'or' in a construction like (75a) come from the Double Marking of one J element; the two occurrences of *yībiān* 'and' in a construction like (75b) also come from the Double Marking of one J element.

I claim that the Double Marking of J causes the occurrences of two portmanteaux in each CC. In a CC in English, if J is doubly marked, each J marker and a functional head in the C-domain (e.g., Force in Taylor 2013) undergo Svenoniu's (2012, 2021, 2023) spanning, forming a portmanteau morph *the* in each clause. The CC in (76a) has the structure in (76b).

(76) a. The cooler the weather got, the happier Susie became.

b.



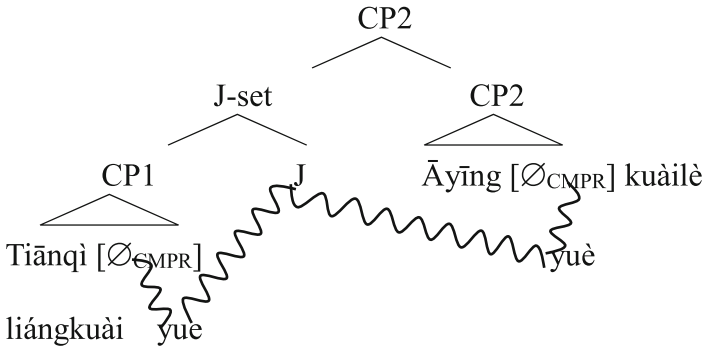

In a Mandarin CC, if J is doubly marked, each J marker and a comparative Deg undergo spanning, forming the portmanteau *yuè*, in each clause. (77a) has the structure in (77b).

[9] In a Mandarin construction like (i), the first *yòu* is optional. It can be a focus maker. The same is true of the double *huòzhě* 'or' construction in the language (Zhang 2008: 327, 309).

(i) Kèfēi (yòu) gāo yòu pang 克非(又)高又胖。
Kefei and tall and fat
'Kefei is both tall and fat.'

(77) a. Tiānqì yuè liángkuài, Āyīng yuè kuàilè.
weather more cool Aying more happy
'The cooler the weather got, the happier Susie became.'

b.




The double markers do not need to be identical (Nichols 1986). In (76) and (77), the two forms in the Double Marking are the same, but those in (15) and (16) are different. The two forms also do not have to occur in the same position, as seen in (72). But in each clause, the portmanteau occurs in the same complementation line

Spanning and Double Marking are two morphological operations in the opposite directions. One combines different morphemes together, and the other realizes one morpheme as two forms. Such formatives, "they exist, because of the workings of spell-out, the mapping of syntactic structure to phonological form" (Svenonius 2023: 1). Double Marking of a functional element (J) is seen in (75), and spanning of different heads is seen in (68). The formatives in CCs, however, are formed by both Double Marking and spanning, illustrated in (76) and (77).

I conclude that if we recognize J, the pairing of the formatives in a CC can be captured by the Double Marking of this functional element, forming a portmanteau with another functional element via spanning in each clause of a CC.

In 4.2, we saw two versions of CC: one is with a pair of special formatives but rejects a conjunction, and the other has no special formative but allows a conjunction. According to Abeillé et al (2006) and Abeillé & Borsley (2008), the two versions are different in the parallelism between the two clauses in Romance languages. Subject-auxiliary inversion in S2 alone is possible in the former version, but not in the latter version (we also saw this in (4a)); and extraction from S2 alone is possible in the former version, but not in the latter version (we also saw the Wh-movement from S1 alone in (65d); also see C&J: 555).

The parallelism contrast reminds us of Ross's (1967) Coordinate Structure Constraint (CSC), which disallows the movement of elements out of a single conjunct. This constraint has been shown to be the effect of interfaces between syntax and pragmatics (e.g., Kehler 2002, Zhang 2010, Altshuler & Truswell 2022, also see Sportiche 2024). The parallelism contrast in the two versions of CC can be related to processing efficiency. In one version of CC in Romance languages, J is realized by both spanning and Double Marking, and thus both clauses are marked

with a special formative. The correlation relation of S2 to S1 is thus easy to process. Therefore, operations that ignore the CSC is possible. In contrast, in the other version, J is realized by a conjunction, whose semantic function is vague (considering various semantic relations between conjuncts). Thus, the intended correlative relation of the two clauses is not easy to process. A parallelism in form between the two clauses (obeying the CSC) helps the processing efficiency.

The conclusion of this subsection is that the pairing of the special formatives of a CC comes from the Double Marking of J, a morphological strategy also seen in other constructions.

In this section, I have unraveled the three puzzles of CCs. I have shown the mutual dependency of the two clauses, capturing their inconsistent root or non-root clause status. I have also argued that the two formative puzzles are captured by both J's Double Marking in the two clauses, and the spanning of J and another functional element in each clause of the construction.

## Conclusions

This paper has explained three fundamental syntactic puzzles of CCs, as summarized in (78).

| (78) | CC puzzles | Proposed analyses |
|---|---|---|
| a. | The inconsistent root and non-root clause status of S1 and S2 | S1 has the same syntactic position as a Conditional Conjunct: the complement of J. It is lower than S2. But S2 is a relational clause, licensed by S1. Thus, the two clauses are dependent on one another. Neither is thus a typical root or non-root clause. |
| b. | The special use of the formatives | Each of such formatives is a portmanteau coming from the spanning of J and another functional element of the clause. |
| c. | The pairing of the formatives | This is the result of the Double Marking J, also found in other constructions. |

I have also reported that S2 of a CC must be licensed syntactically, unlike other kinds of relational expressions.

Like some other research works (e.g., den Dikken 2005, Taylor 2013, E 2014, and Soltan 2020), this research also shows that CCs are not syntactic primitives (cf. C&J; Abeillé et al. 2006). They are built by the general operations and functional elements in syntax. Consequently, there is no CC-specific syntax.

The unified analysis of coordination and modification proposed in Zhang (2023) helps to understand the syntax of CCs. There are different types of coordinate

constructions. I have shown how a CC shares formal property with one type of asymmetrical coordinate construction, in contrast to symmetrical coordinate constructions. Also, in the absence of a coordinator, the apparent CC-specific formatives can be the externalization of the same functional element that occurs in coordinate constructions. Thus, a CC is syntactically like an asymmetrical coordinate construction. Consequently, there is no coordinate construction-specific syntax.

**Acknowledgements** I am grateful to the anonymous reviewers for their both critical and constructive comments on an early version of this paper, and to James Myers and Dalina Kallulli for the discussion of some of the data. I am also grateful to the comments on certain technical issues of this research from James Huang, Dalina Kallulli, and many other participants of the 2024 Linguistic Summer Institute of Taiwan. Remaining errors are my own. This research has been partially supported by the grants from Taiwan National Science and Technology Council.

**Author contributions** I did all of it.

**Declarations**

**Conflict of interest** The authors declare no competing interests.



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