

Across-the-Board Phenomena

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Abstract

Across-the-Board phenomena in linguistics, ATB for short, can generally be defined as one-to-many correspondences. Standard examples involve *wh*-extraction out of two or more coordinated clauses or phrases at once, as in *Which teacher did John like _ and Sue hate _?* Such configurations violate an otherwise valid bi-uniqueness principle: an antecedent licenses one and only one dependent element; furthermore, they are at variance with the alleged island status of coordinate structures. As such, ATB phenomena constitute an intriguing syntactic puzzle. There are diverse views on the nature and explanation of ATB, as well as on the question of which construction types can be subsumed under it. Coordination is clearly an important factor, since ATB does not normally involve hierarchically different positions, with the possible exception of parasitic gaps and a few other construction types. It has also been claimed that ATB phenomena extend to certain cases of ellipsis, including right node raising. Apart from this, it is evident that various types of features, including case, can be spread over multiple conjuncts, and that binding by some antecedent outscoping the entire coordination phrase may concern pronominal variables in more than one conjunct at once. This raises the question of whether some kind of multidimensional representation is required for coordinate structures. Related topics to be discussed from the current perspective are forward versus backward multiple dependencies, and split antecedents.

Keywords: coordination, multiple dependencies, parallelism, symmetry, asymmetry, *wh*-movement, ellipsis, multidominance, scope, binding, variable, split antecedent, parasitic gap

1 Introduction

Ross (1967: §4.2.4) first described Across-the-Board phenomena (ATB) as a class of rules that move a constituent out of all the conjuncts of a coordinate structure at once. To these parallel movement rules, the Coordinate Structure Constraint (CSC) does not apply. Ross originally focused on backward conjunction reduction and relative clause formation. Williams (1978), in an important elaboration, adds *wh*-movement in embedded questions to the picture, as well as instances of forward ellipsis, namely conjunction reduction and comparative deletion. Some of the original examples will be cited below. Nowadays, standard examples can be considered *wh*-movement constructions as in (1):

- (1) *Which book* does Peter like and Susan hate?

Here, the *wh*-object is extracted from two conjoined clausal projections at once. This is remarkable, since the CSC says that “In a coordinate structure, no conjunct may be moved, nor may any element contained in a conjunct be moved out of that conjunct” (Ross 1967: §4.2.1). Although the precise formulations and even the existence of both the CSC and ATB are now contested (for discussion, see Gazdar 1981, Steedman 1985, Wilder 1994, Zhang 2004/2010, and Chaves 2012, among others), it is descriptively clear that coordinate structures can be subject to parallelism requirements (setting complications aside for a moment), and therefore potentially block certain syntactic dependencies *unless* these apply to every conjunct simultaneously. This is illustrated in (2), where (2a) (=1) represents the ATB pattern:

- (2) a. *Which book* does [Peter like _] and [Susan hate _] ?
b. **Which book* does [Peter like _] and [Susan hate Moby Dick] ?
c. **Which book* does [Peter like Moby Dick] and [Susan hate _] ?

In (2a), the fronted *wh*-phrase *which book* can be related to the object position of both *like* and *hate*, that is, to a variable in both conjuncts between brackets (indicated by underscores). In (2b) and (2c), extraction takes place out of only one conjunct, and this is ruled out in semantically symmetrical configurations. Notice that it is not the case that conjuncts must be *internally* parallel to each other in every respect: although clause types are normally synchronized, coordinated clauses sometimes differ with respect to voice, tense, and aspect, or the positioning of arguments, adjuncts, and particles. However, potential relationships with an *outside* element must be similar – with certain exceptions, to be discussed below.

Parallelism requirements aside, ATB clearly shows that coordinate structures themselves (conjunction phrases in X-bar terms) are not inherent barriers for movement or grammatical dependencies more generally. This is corroborated by the fact that ATB is blocked whenever the corresponding movement in a singular structure would be blocked; see (3), for instance:

- (3) a. **Which book* do you know [a man that likes _] ?
 b. **Which book* do you know [a man that likes _] and [a woman that hates _] ?

Extraction from a relative clause in a complex noun phrase is normally banned, and this is no different in ATB configurations. Therefore, ATB is not simply an exception to constraints on movement. Rather, it represents an interesting consequence of the grammar's capacity to duplicate relationships by means of coordination.

This change of perspective is also useful when the more controversial case of backward conjunction reduction is studied, illustrated in (4). Here, the object again relates to two verbs at once, but now the dependency is backwards.

- (4) Peter likes, and Susan hates, *this book*.

In Ross (1967), Postal (1974), and later work, such constructions are conceived of as rightward ATB movement rather than backward ellipsis. This immediately shows that it depends on definitions and analyses what counts as a proper ATB phenomenon.

Generally, Across-the-Board phenomena can be defined as one-to-many correspondences: one operator or antecedent licenses two or more variables or otherwise dependent elements. It is interesting that the grammar seems to allow this possibility, since it is in contradiction with a simple principle of bijection or bi-uniqueness that might fit the theoretical ideal.¹

This chapter is organized as follows. Section 2 discusses regular ATB movement constructions and analyses thereof. Section 3 highlights other (potential) instances of ATB phenomena, including ellipsis, parallel feature checking, and split antecedents. Section 4 is the conclusion. For reasons of space, the majority of the examples are in English, but similar data can be produced in many other languages as well.

¹ See Koopman & Sportiche (1982) for a specific implementation concerning operator-variable relations, or Chomsky's (1981) Theta Criterion, which is also bidirectional. But the principle could be formulated more generally for any kind of dependency; see also Wilder (1994) and especially Koster (1999, 2003). Although it is generally accepted that a dependent element must have exactly one antecedent, the inverse is not. In Neeleman & Van de Koot's (2002) Bare Phrase Structural derivation of Koster's (1987) original 'Configurational Matrix', for instance, it is taken for granted that one-to-many correspondences are possible – with reference to ATB phenomena, unsurprisingly. Koster himself in his more recent work simply sets aside such facts as exceptions that may involve two links rather than one complex one, while stressing the importance of bi-uniqueness in other respects. See section 3 for more discussion.

2 Leftward ATB movement

2.1 A concise empirical survey

ATB *wh*-movement can be found in a variety of *wh*-constructions. The examples in (5) show this for direct and embedded *wh*-questions, and relative clauses:²

- (5) a. *Which book* did you say that Peter likes _ and Susan hates _?
b. I wonder *which book* Peter likes _ and Susan hates _.
c. I know a book *which* Peter likes _ and Susan hates _.

Williams' (1978: 31) original example fragment was *who John saw and Bill hit*.

Wh-extraction out of coordinated CP-clauses is a possibility, but it also works if the coordination is at a lower level, say of IP, VP, or even DP constituents:

- (6) a. *Who(m)* did you say [(that) Peter likes _] and [(that) Susan hates _]?
b. *Which teacher* does [Peter like _] and [Susan hate _] ?
c. *What* did Peter [buy _ last week] and [throw away _ yesterday] ?
d. *Which famous scientist* did Peter read [a book by _] and [a newspaper article about _] ?

In some cases it is not immediately clear if the sentence involves ATB from coordinated phrases (7a) or simply coordination at the word level (7b).³

- (7) a. *Which book* did John [buy _] and [read _]?
b. *Which book* did John [buy and read] _ ?

In what follows, potential ambiguity of this kind is avoided.

The moved phrase does not need to be an object or even a noun phrase: in principle, it can have any syntactic function and any categorial status. This is illustrated in (8a-c):

- (8) a. *Which man* did you say _ bought a new car and _ sold his boat? (subject, nominal)
b. *How fast* did John speak _ and Mary write _ during the meeting? (adjunct, adjectival)
c. *In whose car* did John fall asleep _ and Mary vomit _ ? (adjunct, prepositional)

Potential symmetry requirements are discussed in the next section.

ATB extraction is also allowed with other kinds of A'-movement, including topicalization (9a-b). This implies that the ATB-moved constituent does not need to be a *wh*-phrase. Example (9b) is presented in Dutch, a verb second language, where it is clearer than in English that the adverbial phrase is actually moved.

- (9) a. *This man*, Peter wants to meet _ but Susan prefers to avoid _.

² Salzmann (2012a) also provides examples from Zurich German in which one or both of the relative gaps can be replaced by a resumptive pronoun (in that case, there is no relative pronoun, but an invariant complementizer *wo*).

On a historical note, Ross (1967) discusses ATB relative clause and question formation, but not *wh*-movement in the sense of (5). There appears to be some confusion about this in the literature. His example (i), for instance, crucially contains two *wh*-elements; what is construed ATB, apparently, is the relative head NP, which has a copy representative in each embedded conjunct according to Ross' description. This is depicted in (ii), from which the surface representation in (i) is to be derived:

(i) Students who fail the final exam or who do not do the reading will be executed. (Ross 1967: §4.2.4.1)
(ii) [_{NP} [_{NP} *Students*] [_S or [students fail the final exam] [students do not do the reading]]] will be executed.

³ However, the option of head coordination has been contested on independent grounds (Kayne 1994: 59-63).

- b. *Op zondagen* wil Peter _ feestvieren en Susan _ studeren.
 on Sundays wants Peter party and Susan study
 ‘On Sundays, Peter wants to party, and Susan wants to study.’

Also note that ATB relativization may involve a null relativizer in English (10a), or a *d*-relative pronoun as in the Dutch equivalent (10b).⁴

- (10) a. These are the books *OP* (that) Peter wrote _ and Susan admired _.
 b. Dit zijn de boeken *die* Peter _ heeft geschreven en Susan _ bewonderd.
 these are the books DEM:REL Peter has written and Susan admired

But ATB is not limited to A'-movement. The following examples show A-movement in raising and passive contexts, respectively:

- (11) a. *Peter* seems to _ like plays and to _ go to the theater quite often.
 b. *This book* is written _ by Peter and illustrated _ by Susan.

ATB head movement is also attested. In (12a/b), the finite aspectual, temporal, or modal verb is extracted from both conjuncts:

- (12) a. Never *has* Peter _ eaten pork or Mike _ drunk alcohol.
 b. Never *will/may* Peter _ eat pork or Mike _ drink alcohol.

ATB scrambling of an object across adverbs can be illustrated in Dutch:

- (13) Susan heeft *dit boek* gisteren _ gekocht en vandaag _ gelezen.
 Susan has this book yesterday bought and today read
 ‘Susan bought this book yesterday and read it today.’

Similarly, ATB clitic extraction is possible in Romance and Slavic languages. The following example is from European Portuguese, cited from Matos (2000:233):

- (14) Todos *o* viram _ na aula e cumprimentaram _ delicadamente.
 all him_{CL} saw in.the classroom and greeted politely
 ‘They all saw him in the classroom and greeted him politely.’

In English, so-called *tough* movement can take place in ATB fashion:⁵

- (15) *Love* is hard to find _ and easy to lose _.

Thus, it is clear that ATB phenomena are not limited to *wh*-movement, but can involve any possible kind of extraction.

⁴ Relative *d*-words in various Germanic languages are not complementizers but pronouns, unlike English *that*. This is evident from agreement paradigms, pied piping, etc. What is confusing is the sometimes homophonous demonstrative form of the complementizer. See De Vries (2002:155ff) for discussion and further references.

⁵ Chomsky (1981) analyzes this complex construction type in terms of operator movement. For more recent discussion, see Hicks (2009) and Zwart (2012), among others.

2.2 Symmetry and asymmetry

2.2.1 Conjuncts and parts of conjuncts

The CSC consists of two parts that turn out to have a different status (see Grosu 1973 and others since). These may be referred to as the Conjunct Constraint (“no conjunct may be moved”)⁶ and the Element Constraint (“no element of a conjunct may be moved out of the coordinate structure”). The ATB ‘exception’ naturally applies to the latter only; if full conjuncts were ATB-moved, the result is both nonsensical and nearly impossible to parse. Compare (16a) to (16b):

- (16) a. * Who_i did you meet _i and _i ?
b. * Did you meet John_i and John_i?

The *wh*-operator in (16a) needs to license both variables. But this leads to vacuously coordinating a phrase to itself, as in (16b) – or a gap to a gap from a surface perspective; see also Bouma, Malouf & Sag (2001) for comments.

2.2.2. Syntactic functions and theta roles

Even when coordination is underlyingly symmetric, not every type of ATB extraction is allowed. At first sight, the dependency must involve the same syntactic function in each conjunct; see (17), for instance, where *who* corresponds to the subject in the first conjunct and the object in the second, or *vice versa*.

- (17) a. * *Who* did you say [Peter likes _i] and [_i hates Susan] ?
b. * I met a woman *who* [_i hates Susan] and [Peter likes _i].

In languages with morphological case marking, it is evident why this is: the moved phrase would have to have express two conflicting forms; see also Dylá (1984) and Franks (1993) for discussion. But even if certain case differences are not signified, as in the English examples here, the restriction remains. This is remarkable because syncretism generally precludes matching effects (see the Companion to Syntax chapter on Free relatives, for instance). In addition, Williams (1978: 34) notes that subject/object ATB is fine if the subject is embedded; see the contrast in (18):

- (18) a. * I know a man *who* [Bill saw _i] and [_i likes Mary].
b. I know the man *who* [John likes _i] and [we hope _i will win].

⁶ Nonetheless, right-extraposition of conjuncts *is* possible. Most likely, however, this involves (sub-)clausal stripping (i.e., ellipsis), and hence it provides no counterexample to the Conjunct Constraint (*pace* Johannessen 1998: 215-217). Arguments for this view include the distributivity effects illustrated in (i)-(iii). These data follow straightforwardly from an ellipsis account, in which the a.-cases are derived from c. rather than b.:

- (i) a. John _i seem*(s) nice, *and Mary*.
b. John and Mary seem*(s) nice.
c. John seem*(s) nice and Mary seem*(s) nice.
(ii) a. * John _i met, *and Mary*.
b. John and Mary met.
c. * John met and Mary met.
(iii) a. * John _i talked to each other, *and Mary*.
b. John and Mary talked to each other.
c. * John talked to each other and Mary talked to each other.

See Merchant (2003) and Chaves (2012:468) for a similar assessment and pertinent remarks. See De Vries (2002:233ff) and subsequent work for a concrete (and general) proposal of right-extraposition in terms of ellipsis.

According to De Vries (1992) cases like (18a) are unacceptable simply due to parsing problems, and not due to restrictions of the grammar, as proposed in Williams (1978) or Pesetsky (1982). Concretely, the incorrect parse *Bill [saw and likes] Mary* is possible within the embedded clause, but clashes with the context. This view is supported by Chaves (2012:482), who notes that (19) is acceptable despite the fact that the subject is not embedded.

(19) There were some parts that [[I enjoyed _] and [_ were very suspenseful]].

Here, no garden path arises because *I [enjoyed and were very suspenseful]* is impossible.

The following examples show that direct objects can be combined with prepositional objects in ATB constructions:

- (20) a. *What* did you say [Peter stared at _] and [Susan desired _] ?
 b. *Which tree* did you say [Peter hugged _] and [Susan talked to _] ?
 c. *Which criminal* did you say [the citizens feared _] and [the police kept away from _] ?

ATB movements involving an indirect object in double object constructions in combination with other functions can be illustrated in Dutch (generally, non-prepositional indirect objects cannot be *wh*-moved in English, which bleeds more complex examples):

- (21) a. *Wie* heb jij _ geld geleend en _ kleren gegeven? (IO+IO)
 who have you money lent and clothes given
 ‘Who did you lend money [to] and give clothes [to]?’
 b. *Welke man* heb jij uiteindelijk _ het jawoord gegeven, maar (IO+DO)
 which man have you finally the consent given but
 heeft Anna al die jaren _ begeerd?
 has Anna all those years desired
 ‘Which man did you say “I will” to in the end, but did Anna desire all those years?’
 c. *Welke astronaut* is een vlucht toegezegd, maar _ heeft nog geen ruimtepak? (IO+S)
 which astronaut is a flight promised but has yet no space.suit
 ‘Which astronaut:IO was a flight:SU promised [to], but does not have a space suit, yet?’
 d. ? *Wie* zei je dat er _ niet kan lezen, maar jullie toch _ een boek (S+IO)
 who said you that there not read can but you yet a book
 hebben gegeven?
 have given
 ‘Who did you say cannot read, but you:PL gave a book [to] anyway?’

Though often symmetry-violating examples are awkward to some degree (and speakers may judge differently), the fact that acceptable examples can be construed implies that limitations are likely due to extraneous factors such as parsing problems and pragmatics, rather than deep grammatical principles.

In concert with these findings, it is to be noted that different theta roles may be mingled. In (22), *who* represents not only an experiencer, but also an agent, theme, and beneficiary. It is the subject of various kinds of predicates at once: transitive, unergative, unaccusative, and raising.⁷

- (22) *Who* did you say [_ saw a crocodile], [_ ran for an hour], [_ arrived late], [_ seemed to cry], and [then _ received the consolation prize] ?

⁷ Similar issues need to be investigated with respect to Right Node Raising, but this cannot be entertained in detail here.

This state of affairs yields an important question: how is it possible that apparently one phrase is assigned two or more potentially different thematic roles and syntactic functions? Answering this question is a key to understanding ATB.

2.2.3 Embedding and islands

As was mentioned in the introduction, ATB *wh*-extraction is island-sensitive (see (3)). The movement involved is also unbounded; this is shown in (23):

- (23) *Which book* do you think [that Peter said [he bought _]] and [that Susan claimed [she actually read _]] ?

To prevent garden paths, the intended structure can be facilitated by intonational grouping and, to the extent possible, the strategic placement of optional complementizers, as is done in the English examples here.

Conjuncts do not need to be equally complex, but may neither constitute an island. In (24c/d), one of the conjuncts contains a complex noun phrase.

- (24) a. *Which book* do you think [Peter bought _] and [Susan claimed [she actually read _]] ?
b. *Which book* do you think [that Peter said [he bought _]] and [that Susan actually read _] ?
c. **Which book* do you think [Peter bought _] and [Susan knows [a man who actually read _]] ?
d. **Which book* do you think [that Peter knows [a man who bought _]] and [that Susan actually read _] ?

Zhang (2010:226) presents the following pair (annotation added here) that appears to show an asymmetry between the first and second conjunct. However, other speakers consulted found (25b) unacceptable, which matches the situation in (24).

- (25) a. * *Who* did [Bill lose business [because he hired _]] and [Mary praise _ a lot] ?
b. % *Who* did [Bill praise _ a lot] and [Mary lose business [because she hired _]] ?

All in all, there does not seem to be convincing evidence for locality asymmetries, and to the extent there are any, they are speaker-dependent.

2.2.4 Referential identity?

Another symmetry issue is the question of referential identity of an ATB phrase itself. It seems that the most salient reading in (26) is one where the variable bound by the *wh*-phrase is identical in both conjuncts, and receives a strict interpretation.

- (26) *Which book/what/who* does Peter like _ and Susan hate _ ?

Nevertheless, speakers of both English and Dutch consulted report an available *respectively* answer to questions like this, depending of course on a plausible discourse. In (27a), such a sloppy reading is even forced (a song cannot be sung before it has been composed, so different songs must be involved), and the sentence is perfectly acceptable, e.g., in the context of two available lists of

songs, one pertaining to compositions and one to performances.⁸ Another example is (27b), where it seems plausible that the number of matches involved is different for Peter and Susan.

- (27) a. I wonder *which song* Peter composed _ today and Susan sang _ yesterday.
b. *How many matches* did Peter play _ and Susan win _?

Thus, contrary to suggestions in the literature (see especially Zhang 2010), there is no ‘identity requirement’ in ATB.⁹

Referential identity can also be tested in topicalization constructions. The uniqueness property of definites automatically leads to a strict identity reading (28a). A specific indefinite (28b) usually receives a strict interpretation, but a sloppy one is not necessarily excluded, as before. The plural indefinites in (28c/d) receive a generic interpretation; in that case there is identity of the kind function, but not of individual entities. Finally, the modal context in (28e) facilitates a nonspecific reading for the indefinites; one could say that this automatically leads to a sloppy interpretation.

- (28) a. *This/my/the car*, Peter admired _ and Susan bought _.
b. *A red car*, Peter admired _ and Susan bought _.
c. *Such cars*, the poor man desires _ and the rich man can afford _.
d. *Cats*, Peter likes _ and Susan hates _.
e. *A red car / red cars*, Peter would like to have _ and Susan would hate to have _.

Furthermore, when a complex topicalized phrase contains a pronoun, a sloppy reading of the embedded variable becomes readily available:

- (29) a. *Pictures of himself_{i resp. j}*, Hollande_i hates _ but Putin_j loves _.
b. *His_{i resp. j} own mother*, Peter_i likes _ and John_j hates _.
c. *Calling his_{i resp. j} mother*, the winner_i of the tennis match attempted _ but the loser_j avoided _.

This is similar in *wh*-constructions: (30a/b) are based on Haïk (1985: 286) and Ha (2008:254), respectively.¹⁰

- (30) a. I wonder *which picture of himself_{i resp. j}* Peter_i likes _ and John_j hates _.

⁸ This apparently contradicts Heycock & Zamparelli (2000:351), where a similar example is tagged #, but according to their description the intended reading is merely unlikely, not necessarily impossible.

⁹ In English, an emergent, non-reconstructed plural can sometimes be used to force a *respectively* reading; see Gawron & Kehler (2004), who expand on Munn (1999:421):

- (i) Q *In what cities* did Mary vacation _ and Bill decide to live _ ?
A Mary vacationed in Paris and Bill decided to live in Toronto.

Munn argued that such questions involve a complex functional reading; consequently, a supposed ATB identity requirement could target this function rather than its argument index (note that a similar reasoning may apply to kind readings as in e.g. (28c/d) below). According to Zhang (2010), such instances of non-identity in ATB configurations must be theoretically set apart from the regular ones, requiring a different analysis, in which the preposed phrase is generated outside of the coordination; see also Woolford (1987) and Chaves (2009) for some related discussion concerning ATB adjunct extractions. However, the widespread availability of sloppy readings presented in the main text – also in regular arguments (i.e., non-adjunctions) – casts serious doubt on this approach.

¹⁰ Both Haïk (1985) and Munn (1992:10) report a curious asymmetric strict reading for some English speakers; see (i). This requires *himself* to be used logophorically in the second conjunct.

- (i) *Which picture of [%]himself/*herself_j* did John_i buy _ and Mary_j paint _ ?

Note that with a proper local anaphor such as Dutch *zichzelf* (which is underspecified for gender), this is impossible, and only a sloppy reading can be obtained: *Welk schilderij van zichzelf_{i resp. j} heeft John_i gekocht _ en Mary_j geschilderd _?*

- b. Q *Whose car* does John_i like _ but Bill_j hate _ ?
 A His_{i resp. j} own car.

In conclusion, wherever non-identity readings are available on independent grounds, they can be obtained in ATB constructions.

2.2.5 Multiple ATB

So far, most illustrations involved two conjuncts, but there is no principled boundary to the number of dependencies (see also (22) above). Example (31a) involves a quadruple instantiation of ATB *wh*-movement; triple ATB in a non-restrictive relative clause (31b) is taken over from Pesetsky (1982: 444).

- (31) a. *Who* does Peter like _ , Susan admire _ , Mike hate _ , and John detest _ ?
 b. John, *who* I bought a picture of _ , a story about _ , and a book by _

Every conjunct necessarily participates in the particular dependency, and interruptions of parallelism as in (32) are generally disallowed. Compare (32) to (31a):

- (32) * *Who* does Peter like _ , Susan admire the president, Mike hate _ , and John detest _ ?

Somewhat similarly, if more than one constituent is ATB-moved, the double dependency must be present in each conjunct; see the following examples, slightly adapted from Pesetsky (1982: 445):

- (33) a book *OP_i* that I know *who_j* to...
 a. ... [[talk to __j about __i] and [persuade __j to buy __i]].
 b. *... [[talk to Bill about __i] and [persuade __j to buy __i]].
 c. *... [[talk to __j about Mary] and [persuade __j to buy __i]].

However, parallelism requirements are weakened in semantically asymmetric coordinations, as is documented in Lakoff (1986), for instance:

- (34) *How many courses* can you [take _ for credit], [still stay sane], and [get all A's in _] ?

It is debated whether asymmetric coordinations are true coordinate structures at all levels of representation, and also if extraction is real in these cases: according to Postal (1998), a silent resumptive pronoun may be involved (however, see Levine 2001 for a critical reply). Such issues are beyond the scope of this chapter.¹¹

2.2.6 ATB in multiple *wh*-fronting languages

Some languages allow fronting of more than one *wh*-phrase in multiple questions, unlike the situation in English. This provides an interesting testing ground for ATB behavior. As Citko (2011:57) illustrates for Polish, double spell-out of an ATB-extracted *wh*-phrase is generally disallowed (35a), whether *i=j* or *i≠j*, but what can be done is ATB extraction of two different *wh*-phrases from both conjuncts (35b):

¹¹ Examples of asymmetric extraction were already discussed in Ross (1967); see also Schmerling (1972). Goldsmith (1985), Lakoff (1986), Culicover & Jackendoff (1997), and Kehler (2002) concluded that the CSC cannot be a syntactic constraint. This view is opposed by Postal (1998) and De Vos (2005). See Zhang (2010) and Chaves (2012) for a recent overview, as well as the separate Companion to Syntax chapter on Asymmetric Coordination. See also section 2.2.7 and the related footnotes 12 and 13.

- (35) a. *Co_i co_j [Jan zgubił t_i] a [Piotr znalazł t_j] ?
 what what Jan lost and Piotr found
 ‘What did Jan lose and Piotr find?’
 b. Co_j komu_i [Jan kupił t_j t_i] a [Piotr wysłał t_j t_i] ?
 what whom Jan bought and Piotr sent
 ‘What did Jan buy for whom and Piotr send to whom?’

Extraction of two distinct *wh*-objects from the same position in separate conjuncts is unacceptable, as noted in Kasai (2004:169) for Serbo-Croatian and other languages; see (36a). What is attested, however, is regular subject question formation in combination with ATB *wh*-extraction of an embedded object from multiple conjuncts. The Serbo-Croatian example in (36b) is taken from Bošković & Franks (2000:111).

- (36) a. *Koga_i šta_j on [vidi t_i] i [jede t_j] ?
 whom what he sees and eats
 ‘[*] Whom what does he see and eat?’
 b. Ko_i šta_j t_i tvrdi [da Jovan kupuje t_j] i [da Peter prodaje t_j] ?
 who what asserts that John buys and that Peter sells
 ‘[*] Who asserts that John buys what and that Peter sells what?’

In short, ATB in multiple fronting languages may result in somewhat complex patterns, but in fact behaves as one would expect.

2.2.7 Covert ATB?

Interestingly, multiple questions result in partial *wh-in-situ* in English and many other languages (37a), but doubling of this situation across conjuncts is excluded (37b). This contrasts notably with (36b).

- (37) a. *Who* said that John bought *what*?
 b. **Who* said [that John bought *what*] and [that Peter sold *what*] ?

According to Bošković & Franks (2000), such data suggest that ATB movement cannot take place covertly at LF. This appears to be confirmed by their example (38b), where only the low scope reading for the universal quantifier is available, whereas it can normally obtain a high scope reading (38a) – a fact often explained in terms of covert Quantifier Raising:

- (38) a. *Some* boy hugged *every* girl. ($\exists > \forall$ or $\forall > \exists$)
 b. *Some* boy [hugged *every* girl] and [kissed *every* girl]. (only $\exists > \forall$)

However, a wide scope reading for *every* is available in Right Node Raising contexts such as (39); see also Sabbagh (2007):

- (39) A (different) reviewer read through _ and passed judgment on, *every submission*.

Furthermore, RNR repairs the type of problem noted in (37b):

- (40) a. Who said that John bought (_/*what) and Peter sold *what*?
 b. What explains (_/*what) or provides an excuse for *what*?
 c. Who received bribes from (_/*whom) or was threatened by *whom*?

It seems, then, that (covert) ATB hinges on sharing of the phrase to be moved. In (37b) and (38b) this is not the case.

According to Mayr & Schmitt in the chapter on Asymmetric Coordination, covert ATB movement is necessary in so-called SLF-coordination in V2-languages ('subject lacking in finite clauses'; see Höhle 1983).¹² The relevant German example is translated into Dutch here:

- (41) *Helaas heeft geen van mijn kennissen een hond of _ kan met katten omgaan.*
 unfortunately has none of my acquaintances a dog or can with cats deal
 'Unfortunately, no acquaintance of mine has a dog and no acquaintance of mine knows how to deal with cats.'

If they are right that coordination is at the C'-level, the overt subject *geen van mijn kennissen* 'none of my acquaintances' must move out of the first conjunct in order to outscope the coordinator *or* (note that this is obligatory, which contrasts with the situation in (38a), where the reverse scope reading is optional). However, if coordination were below the subject – i.e., at the I'-level, cf. Zwart 1991 in particular –, the problem of scope does not arise in the first place, and there is no need for covert ATB in these examples.¹³

2.2.8 Parasitic gaps vs. successive cyclic movement

ATB-extractions in coordination contexts may be compared to parasitic gap constructions, which also involve a single visible *wh*-operator and two dependencies (Taraldsen 1981, Engdahl 1983). A typical example is (42):

- (42) *Which book* did Peter burn _ [without reading _] ?

Here, the gap inside the PP adjunct – an island for extraction – is said to be parasitic on the object trace. Without regular *wh*-movement, there can be no gap inside the PP; see (43a), where the pronoun *it* is obligatory. By contrast, movement of the object of the matrix verb is not dependent on a gap inside the adjunct; see (43b), where *it* is optional:

¹² A perhaps related piece of data concerns the phenomenon of 'clitic omission' in Czech. In (i), cited from Dotlačil (2008), the clitic object *ho* 'him' is interpreted in both clauses, but visible only in the first:

- (i) *Zavolal jsem ho a představil _ známým.*
 called AUX:1SG him and introduced friends
 'I called him and introduced him to friends.'

According to Dotlačil, the shared clitic is covertly ATB-extracted, and for some reason spelled out in its base position inside the first conjunct only.

This differs from other types of object gaps. For instance, in Dutch, (ii) is possible for some speakers. This requires an intonational pattern that is similar to the one found in gapping constructions. Crucially, if the object is missing from the second conjunct, this is necessarily in tandem with the finite verb. Furthermore, the construction is acceptable (more easily so, even) without subject-verb inversion – hence, if no phrase is preposed. For these reasons, it seems quite plausible that (ii) involves forward ellipsis of the gapping/stripping type. Unfortunately, this conclusion diverges from the one drawn in the chapter on Asymmetric Coordination, where similar object gaps in German are discussed.

- (ii) % *Vreemd genoeg wilde PEter het huis SLOpen en SuSAN _ renoVERen.*
 strangely wanted Peter the house demolish and Susan renovate
 'Strangely, Peter wanted to demolish the house and Susan wanted to renovate it.'
 (or: '... and Peter wanted to renovate Susan' – not intended)

¹³ There is another issue related to SLF, namely the possibility of preposing a phrase, say an object, from the first conjunct only. This seems acceptable in German, but it is questionable in Dutch. It contrasts with the situation in (41), where the adjunct *helaas* 'unfortunately' can be related to both conjuncts. Clearly, such cases violate the CSC; see Heycock & Kroch (1994) and Reich (2007) for discussion.

- (43) a. Peter burned the book [without reading *(it)].
 b. *Which book* did Peter burn _ [without reading (it)]?

Both dependent elements in (42) are c-commanded by the *wh*-phrase, but there is no c-command between them. Thus, there appears to be a complex dependency involved, and hence an ATB configuration in the general sense.¹⁴

Similarly, there are parenthetical-like insertions containing an additional gap (cf. Huybregts & Van Riemsdijk 1985 and De Vries 2009/2013 for some related examples and discussion):

- (44) *Which proposal* did Peter, although in his heart against _, vote in favor of _ ?

Again, there is no regular coordination involved, and the two dependent positions are not linked via c-command.

This differs from the situation in long-distance movement constructions, in which phrases may be displaced via intermediate positions in a successive cyclic fashion:

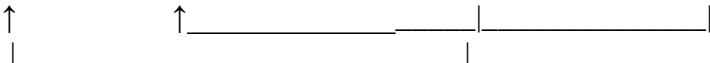
- (45) *What* do you think [_ (that) Peter bought _] ?

Here, the intermediate trace/copy/position does c-command the lower one, and each successive movement step can be licensed independently. Thus, (45) involves a concatenation of dependencies rather than a multiple dependency; that is, it is not a one-to-many configuration in the ATB sense.

2.3 Theoretical approaches

Various approaches to ATB can be distinguished, in particular with respect to *wh*-constructions. This section contains an overview of the main ideas put forward in the literature.

The central question is how one visible operator can relate to two or more variables. A logical possibility, depicted in (46), is that all *wh*-phrases involved are moved separately from their respective conjuncts, after which each but the first is obligatorily deleted.

- (46) *Which book* (~~*which book*~~) does Peter like _ and Susan hate _ ?
- 

This scenario is highly unlikely, however, because it would involve processes that are otherwise not available (multiple *wh*-movement in English, haplology of entire phrases, referential linking of separate chains), and each individual movement would violate the CSC. Therefore, it appears that the individual movements need to be collapsed in some way. The picture in (47) represents a pretheoretical ‘forking movement’ view on ATB.

- (47) *Which book* does Peter like _ and Susan hate _ ?
- 

Williams’ (1978) solution is dependent on a particular analysis of coordination involving ‘factorization’. In informal terms, this means that the comparable parts of the conjoined clauses are combined in groups, roughly as illustrated in (48):

¹⁴ However, a sideward movement theory of parasitic gaps (cf. Nunes 2001) gives an interesting twist to this perception. See also the next section.

- (48) ... | Peter like | which book | and
 | Susan hate | which book |

Wh-movement will then place a single copy of the *wh*-phrase in a higher position (COMP), and empty the entire factor where it originates.

In this line of thinking, coordination requires some sort of three-dimensional representation. For a variety of proposals along those lines, but based on different formalizations, see Goodall (1987), Chametzky (1987), Mu'adz (1991), De Vries (1992), Moltmann (1992), Grootveld (1994), and De Vries (2005). An important concept used in tandem is *structure sharing* (which is still applied in current theories of multidominance; see below). In the simplified representation in (49), the *wh*-phrase is shared between both conjuncts, and subsequently moved.

- (49) Which book does < Peter like > –
 Susan hate >

The problem of a double operator-variable dependency in ATB constructions vanishes on this view, since there is only one moved phrase – shared between all conjuncts – and one trace/gap. This is a major advantage.

In a Minimalist framework, structure sharing can be derived if external remerge (or ‘parallel merge’) is allowed. Proposals to analyze ATB in such terms include Citko (2005), Kasai (2007), Gracanin-Yuksek (2007), and De Vries (2013). The resulting representation for the current example is given in (50), again abstracting away from the details of regular sentence analysis. Here, *which book* is merged with each verb successively, and later in the derivation with the C'-projection. Crucially, such theories are not theoretically multidimensional in the real sense of Williams (1978) or Grootveld (1994), despite popular belief.

- (50)
-
- which book

It must be noted that analyses involving ‘sideward’ movement assume the same derivation (sequence of mergers), but represent movement in terms of copies instead of multidominance; see Nunes (2001), Hornstein & Nunes (2002). According to De Vries (2009), they are formally equivalent.

Approaches involving structure sharing or sideward movement are not generally accepted, however, for they require a less restrictive grammar and a more complex linearization procedure than standardly assumed (see, for instance, Van Oirsouw’s 1987 critique of Goodall’s early work). Furthermore, possible asymmetries in syntactic function and thematic role (cf. section 2.2.2) are

potentially problematic, since these apparently require the licensing of different sets of features in one (shared/remerged) phrase. However, both Citko (2011) and De Vries (2012) suggest the possibility of sharing *below* the highest DP level, which may be a solution to such issues (i.e., what is similar in both conjuncts is the shared core; what is dissimilar involves higher functional projections that are not shared). Furthermore, post-syntax morphology may resort to rescuing strategies in cases of conflicting feature bundles, causing proximity effects; see Kluck (2009).¹⁵

Suggesting a different route, but unfortunately ignoring most of the relevant extraction data, Sjoblom (1980:27ff) elaborates upon a remark in Chomsky & Lasnik (1977: 491): “On general grounds, it would be well to explore the possibility that there is no dual extraction from conjoined clauses; rather, the *wh*-word that appears derives from the first clause while some sort of deletion applies in the second.” See also George (1980). But it seems that it is only in Wilder (1994) that the idea of deletion is taken to its full consequence (see also Salzmann 2012b). Wilder argues that conjuncts can only be root CPs or DPs, i.e., there are no ‘small conjuncts’ of the type assumed hitherto. ATB is a ‘byproduct’ of ellipsis (more precisely, left-peripheral deletion) in non-initial conjuncts. A representation of the simple example used above would be (51a). A slightly more complex one is in (51b):

- (51) a. [Which book does Peter like _] and [~~which book~~ does Susan hate _] ?
 b. [Who did you say [that Peter likes _]] and [~~who~~ did you say [that Susan hates _]] ?

Since there is *wh*-movement within each conjunct separately, ATB as such does not exist within this approach.

Wilder notes and discusses the pertinent problem of interpretation – which goes back to Ross (1967) – posed by rejecting ATB and, more generally, small conjuncts (resulting in an abundance of ellipsis). The point is that a second *wh*-phrase would normally introduce an additional referent.¹⁶ Thus, there must be a referential link between the two instances of *who* in (51b), for instance. Wilder proposes that ‘ellipsis chains’ are created, e.g. {*who*, ~~*who*~~}, similar to movement chains. Here, there is no c-command between the chain members themselves, but Wilder suggests to shift the attention to the roots (conjuncts) containing them.

Another way of removing the ATB stipulation from the grammar, as well as the CSC altogether, is pursued in GPSG. In this framework, gaps are indicated by ‘slash categories’. As Gazdar (1981) points out, the CSC and ATB then simply follow from the like-categories property of coordination. For instance, a VP from which an NP is displaced is a VP/NP, and as such cannot be coordinated with a complete VP. If extraction takes place from both VPs, coordination is fine. A minimal pair from Gazdar (1981:173) involving a relative clause is cited in (52):

- (52) a. *The man who Mary loves _ and Sally hates George computed my tax. (= S/NP & S)
 b. The man who Mary loves _ and Sally hates _ computed my tax. (= S/NP & S/NP)

Thus, ATB is not viewed as an exception to a stipulated constraint, rather, it represents a normal instance of symmetry, which naturally facilitates coordination, whereas a breach of (categorical) symmetry bleeds coordination. Further developments in nontransformational frameworks such as HPSG and (Combinatory) Categorical Grammar can be found in Gazdar *et al.* (1985), Steedman (1985), Bouma, Malouf & Sag (2001), and Chaves (2012), among others.

The simplicity of the argument is quite appealing. Unfortunately, there are also problems involved, setting aside the issues concerning extraction asymmetries mentioned in section 2.2.5, the island data in 2.2.3, the non-identity readings discussed in 2.2.4, and the proliferation of categorical

¹⁵ See also section 3.3 and the related footnote 19.

¹⁶ More generally, interpretation suggests that coordination is always at the lowest possible level (with perhaps heavily marked exceptions as illustrated in footnote 12). For instance, *no books or journals* means *no [books or journals]*, not *[no books] or [no journals]*.

labels (including multiple-slashed categories). Pesetsky (1982:554ff) objects that referential indices on the slashes would be necessary to distinguish them. A relevant example is (53a), which could be ruled out if coordination is sensitive to referential indices on categorial labels.

- (53) a. *a book_i that I know *who*_j to [talk to _{-j}] and [buy _{-i}] (VP/NP_i & VP/NP_j)
 b. John read [a book]_i and [a novel]_j (NP_i & NP_j)

But indices on categorial labels seem anomalous; moreover, it is unclear why such feature assignments would apply to slash categories but not to regular categories, given that (53b) must not be excluded.

A different approach to ATB that must be mentioned here assumes extraction from the first conjunct only, and operator movement inside the second, as depicted in (54). See Munn (1992/1993), and Franks (1993), among others. The coordination phrase contains just the second conjunct, and is viewed as an adjunct to the first. On this view, the CSC cannot be a syntactic constraint.

- (54) *Which book* does [Peter like ₋] [*OP* and Susan hate ₋]?
 ↑_____ | ↑_____ |

Zhang (2010) accumulates evidence against the CSC, but also argues against the adjunction view of coordination and in favor of a regular coordination phrase (where Co is the head and the conjuncts are specifier and complement). Nevertheless, her theory of ATB as such shares important features with Munn's. In her view, there is a silent pronominal variable inside the second conjunct, which is bound by the phrase extracted from the first conjunct only; see (55), slightly adapted from Zhang (2010: 223).¹⁷

- (55) *Which* $\phi_{\langle \text{same} \rangle}$ *book* [₋ does Peter like ₋] and [*pro*- ϕP ~~does~~ Susan hate ₋]?
 ↑_____ | ↑----- | ↑----- |

Zhang stresses the identity reading of such ATB constructions (however, recall from section 2.2.4 that there are also non-identity readings), and explicitly equates the analysis with that of 'thematic licensing *same* constructions' in coordinate clauses (e.g., *The same man got drunk and was arrested by the cops*), presenting this generalization as a major advantage. The example in (56) involves object topicalization:

- (56) *The same man* [Mary helped ₋] and [Jane ruined *pro*- ϕP].
 ↑_____ |

However, it remains unclear why anyone would *not* regard such *same*-constructions as normal instances of ATB extraction (see also the overview in section 2.1), and why other analyses could not cover such cases. Surely, it is true that (57) is not semantically equivalent to (56):

- (57) Mary helped the same man and Jane ruined the same man.

But a pre-transformational deep structure is no longer part of generative theories; meaning is established dynamically or beyond the LF interface. Furthermore, LF-reconstruction after A'-movement may involve the lexical content of phrases, but not their referential properties. Thus,

¹⁷ The additional movements *within* the conjuncts (indicated by dotted arrows here), due to *wh* features, are irrelevant to the general idea. Also note that there is forward deletion of *does*. Zhang does not provide further details of clause structure.

the identity reading cannot be regarded a problem for movement/multidominance theories of ATB. See also the discussion below (51).

Finally, it should be mentioned that Salzmann (2012b) combines the idea of asymmetric extraction from the first conjunct with ellipsis. Like Zhang, he assumes a coordinate structure below the clause level. Within each conjunct, there is movement of the ATB phrase (of which there are two instantiations), but it is only extracted from the first. Ellipsis licensing into the second conjunct is formulated in terms of a specialized [E]-feature, in the spirit of Merchant (2001).

Interestingly, it seems that neither the assumption of asymmetric extraction nor that of sideward movement/multidominance in ATB hinge on explicit coordinate structures *per se*. Therefore, the same mechanisms can potentially be used to explain parasitic gap configurations. Recall from section 2.2.8 that both can be subsumed under the general definition of ATB as many-to-one correspondences.

Earlier, Williams (1990) suggested to reduce parasitic gap constructions to ATB movement, extending the concept of coordination. Postal (1993) shows that this is highly problematic because ATB is much more general than parasitic gaps are in English. From a cross-linguistic perspective, ATB movement appears to be wide-spread, but parasitic gaps of the English type are certainly not universal. For some discussion, see Huybregts & Van Riemsdijk (1985), Rögnvaldsson (1993), Reich (2007), Niinuma (2010), and Salzmann (2012b), among others. The contrast in (58) is cited from Postal (1993: 736).

- (58) a. *How sick* did John look _ and (Betty) say he actually felt _ ?
b. * *How sick* did John look _ without actually feeling _ ?

It is worth noting that there is no principled categorial restriction on selected parasitic gaps, however; see (59), from Levine, Hukari & Calcagno (2001):

- (59) I wonder just *how nasty* you can pretend to be _ without ACTUALLY becoming _.

While it seems indeed far-fetched to stretch coordination to parasitic gap configurations (or for that matter ‘reduce’ the mechanism of parasitic gaps to ATB movement or *vice versa* in some way), a non-construction-specific theoretical generalization over regular ATB and parasitic gaps does not logically imply that they must behave similar in every respect. It may very well be that they involve the same mechanism, but to what extent that mechanism is constrained depends on independent properties of the particular syntactic environment in which it is applied (e.g., conjuncts versus adjuncts). See also Hornstein & Nunes (2002) along these lines.

3 Other potential ATB phenomena

While ATB *wh*-movement is nowadays perceived as the canonical case, it was recognized right from its inception that ATB patterns are more widespread. This section extends the empirical domain, taking a bird’s eye perspective.

3.1 Ellipsis

Next to regular instances of movement, certain cases of ellipsis might be considered as ATB, depending on the particular analyses and definitions.

3.1.1 Doing it backwards: Right Node Raising

The introduction already mentioned backward conjunction reduction, which was assumed to involve rightward ATB movement in Ross (1967) and accordingly dubbed Right Node Raising (RNR) in Postal (1974: 125). Example (60a) is from Ross (1967: 107), another is (60b), where the entire verb phrase is related to both conjuncts; (60c) mimics the parenthetical construction in (44):

- (60) a. Sally might be, and everyone believes Sheila definitely is, *scintillating*.
b. Peter may perhaps, and Susan will definitely, *buy this book*.
c. Peter, although in his heart against, actually voted in favor of, *this silly proposal*.

On a backward deletion account, a multidimensional representation, or a multidominance analysis (see also the separate Companion to Syntax chapter on Right Node Raising), the relevant phrase does not leave the coordination phrase. It is then less clear that such examples represent ATB because there is no one-to-many dependency (although many-to-one selection might be considered as *inverse* ATB; cf. section 3.3).

Differently from ATB movement (cf. section 2.2.3), Right Node Raising is not island sensitive, see (61), for instance, where the relevant selecting verbs are embedded inside a relative clause. See De Vries (2013) for recent discussion and further references.

- (61) John knows a man who likes, and Peter knows a woman who hates, *the prime minister*.

However, a clear similarity between ATB movement and ellipsis is that multiplying the process is straightforwardly possible, but interruptions of parallelism are disallowed; see (62a/b):

- (62) a. Peter likes, Susan admires, Mike hates, and John detests, *the prime minister*.
b. *Peter likes, Susan admires the president, Mike hates, and John detests, *the prime minister*.

This can be compared to (31) and (32).

An interesting issue is referential identity. In (63), the referent of *a book by Dickens* is normally taken to be constant across conjuncts:

- (63) Peter likes, and Susan hates, *a book by Dickens*.

But a sloppy identity is easily possible in the following examples (see also Ha 2008 and Barros & Vicente 2011 for discussion):

- (64) a. Yesterday, the poor man hired [*x*], and the rich man bought [*y*], a red car_{*x* resp. *y*}.
b. The beggar_{*j*} disadvantaged, but the billionaire_{*i*} benefitted, himself_{*i* resp. *j*}.
c. Peter_{*i*} bumped, and Mike_{*j*} bruised, his_{*i* resp. *j*} head.
d. After the tennis match, the winning player_{*i*} did, but the loser_{*j*} did not, call his_{*i* resp. *j*} mother.

Potential speaker and language differences aside, note that these are inherently different from instances of non-reconstructable (non-distributive, cumulative) RNR; see (65a/b(i)), which are accepted by some speakers, but clearly rejected by others:

- (65) a. (i) % Peter yelled, and Susan whispered, *a different curse*.
(ii) Peter yelled a (*different_{≠*j*}) curse_{*i*} and Susan whispered a (*different_{≠*i*}) curse_{*j*}.
b. (i) % Peter said that Marie, and Mike heard that Susan, *have received an award*.
(ii) ... Marie has/*have received an award...

One might argue that a different structure underlies such cases. See also the phenomenon of split antecedents in section 3.3.

3.1.2 Forward ellipsis

Williams (1978: 38ff) proposes a specialized ATB mechanism for instances of conjunction reduction, in particular comparative deletion and gapping; his examples are (66a/b):

- (66) a. John has more cows than Bill has dogs or Pete has horses.
b. John gave the book to Mary and the record to Sue, or the book to Sue and the record to Mary.

In a different fashion, Goodall (1987) and others use structure sharing to account for forward ellipsis; compare (49) above. What is crucially dissimilar from ATB extraction, is that the antecedent/licensor is now inside the first conjunct, rather than in a c-commanding position outside the entire coordinate structure.

A different take on gapping – but not other instances of forward ellipsis – is proposed in Johnson (2009, and earlier manuscripts), where ellipsis *is* reduced to ATB movement. The basic idea is illustrated in (67):

- (67) Peter_s *bought* [t_s _ a book] and [Susan _ a magazine].

Crucially, the displaced verb (or emptied verb phrase) *bought* is related to a base position in both conjuncts. For this to go through, there must be non-parallel movement of the subject from the first conjunct only, which is not easily justified. See also Kim (2003) and Toosarvandani (2013) for critique.

3.2 Pronouns, features, and case

One-to-many licensing need not involve extraction (or ellipsis). Binding relationships can be distributed over conjuncts as well. The examples in (68) illustrate this for reflexive binding and variable binding, or a combination thereof (for instance, Czech would use reflexive possessive pronouns in the equivalent of (68b)).

- (68) a. Peter_i admired [a drawing of himself_i] and [a painting of himself_i].
b. Every boy_i invited [his_i mother] and [his_i father].
c. No CEO_i wondered [whether he_i was really competent for the job] and [why he_i earned so much money].

These are all clear ATB configurations. However, unlike the situation with standard ATB movement, licensing in such cases is not necessarily across-the-board: the variable may figure only in a random subset of conjuncts. Compare (69) to (68b), for instance:

- (69) a. Every boy_i invited [his_i best friend] and [the gym teacher].
b. Every boy_i invited [the gym teacher] and [his_i best friend].

Coordination is no prerequisite either. Moreover, the hierarchical configuration in (70) is quite different from parasitic gap constructions.

- (70) Every boy_i complained to his_i mother that his_i friends called him_i names.

Koster (1987: 28) and Neeleman & Van de Koot (2002:548) provide examples involving anaphors and negative polarity items:

- (71) a. *They* talked with each other about each other.
 b. *They* introduced each other's financial advisors to each other's lawyers.
 c. John didn't introduce anyone's financial advisor to anyone's lawyer.

Thus, it seems difficult to generalize over ATB extraction and multiple binding.

The next candidate for an ATB status is again quite different: it involves case marking. In (72a), from German, the preposition *zwischen* assigns (morphologically visible) dative case to both coordinated DPs. In English, the same pattern can be shown with accusative pronouns (72b):

- (72) a. Er stand *zwischen* [de-n Tote-n] und [de-n Lebende-n].
 he stood between the-DAT dead-DAT and the-DAT living-DAT
 'He stood between the living and the dead.'
 b. Peter was standing *between* him and her.

In (73), the issue is even clearer. In exceptional case marking configurations and *for*-infinitives, the relevant case assignment involves a subconstituent of both conjuncts:

- (73) a. Peter saw [him coming] and [her going].
 b. Peter *believes* [him to be nice] and [her to be bad].
 c. What Peter wants is *for* [him to leave] and [her to stay].

While some of the examples might be explained away by invoking forward conjunction reduction of the left edge (e.g., ... *and believes her to be bad* in (73b)),¹⁸ this is certainly not a general solution. First, plural-taking predicates cannot be treated in this way, cf. *we compared him and (*compared) her*; or *between him and (*between) her*. Second, the coordination as a whole can sometimes be moved away or isolated from the selecting predicate: for instance, [*Him coming and her going*] is what Peter saw.

Despite that, one might object that the relevant examples are not convincing instances of one-to-many relationships because the dependency may be between the case assigner and the entire coordinated phrase. However, this is slightly besides the point. In a similar vein, standard ATB *wh*-movement as in (1) can be explained as a relationship between the *wh*-constituent and a complex category containing a combined slash/gap feature. What is relevant is that a coordination phrase is apparently able to distribute properties over its conjuncts (from a top-down perspective), or accumulate properties from its members (from a bottom-up perspective).

3.3 Split antecedents and other 'inverse ATB' phenomena

Finally, it may be worth considering whether there is 'inverse ATB' in the sense of many-to-one dependencies. In this respect, agreement with coordinated noun phrases could be relevant. In (74), the finite verb shows number agreement with the conjoined subject. In French, and many other languages, adjectives show phi-feature agreement as well; see (75):

- (74) *John and Jack* are busy.

- (75) *Marie et Claire* sont dangereux-e-s.
 Marie and Claire are dangerous-FEM-PL

¹⁸ Left edge deletion implies coordination at a higher level, which seems to be at variance with general economy considerations ('simplest structure'); see also footnote 16.

Notice, however, that the plural marking in these examples cannot be traced back to the separate conjuncts: it is not a distributed property, but an emergent property of the coordination as a whole. This is different from standard ATB, where the distribution of a grammatical relationship over the separate conjuncts is essential. In (75), however, the feature [feminine] can indeed be related to both conjuncts individually. It then needs to be proven that the relationship is not in fact an instance of first or second conjunct agreement. In this particular case, that seems to be true, for if either the first or second conjunct represents a male, the adjective or participle would get a default masculine gender inflection, which is zero. Interestingly, the relevant feminine agreement is retained on a participle in French even if the coordinated subject is inherently distributive, as can be shown by means of an initial coordinator. Example (76) is cited and translated from a random internet blog.

- (76) Ni *les frontière-s de 1948*, ni *celle-s de 1967* n'ont été
 neither the borders:FEM-PL of 1948 nor those:FEM-PL of 1967 NEG-have been
 reconnu-e-s comme limites à l'expansion israélienne.
 acknowledged-FEM-PL as limits to the-expansion Israeli
 'Neither the 1949 borders nor those of 1967 have been acknowledged as limits to the Israeli expansion.'

Generally, agreement resolution across languages and construction types is a complicated matter, and hasty conclusions should be avoided.¹⁹

An abstractly related state of affairs is attested in cases with split antecedents. In (77), the dependent element, the relative pronoun *who*, emerges from the joint interpretation of the separated heads/antecedents (equivalently to the plural pronoun *they*).²⁰ Whether the predicate in the relative clause is collective or inherently individual is irrelevant, as is made explicit in (77b).

- (77) a. A boy_i arrived and a girl_j left *who*_{i+j} hated each other.
 b. I saw *a man*_i in the house and I saw *a woman*_j in the garden *who*_{i+j} **were** {married to each other, (each/both) chewing gum}.

Although the relative clause must be peripheral, such examples are not to be confused with true cases of RNR: in (78), the singular verb in the relative clause and the particular contrastive intonation pattern are only compatible with a distributive reading, here enforced by the use of the *not only...but also* combination:²¹

- (78) I not only saw *a man*_i in the HOUSE, but also *a woman*_j in the GARDEN, *who*_{i/j} **was** {chewing gum, *married to each other, *each chewing gum}.

¹⁹ See Corbett (2006) for an accessible overview. Remarkably, even in a language with a relatively poor morphology such as Dutch, there can be a whole variety of agreement issues related to coordination or feature doubling otherwise. For elaborate discussion, see e.g. Heringa & De Vries (2008), De Vries & Heringa (2008), Kluck (2009), De Vries (2004); dialectal variation and complementizer agreement is examined in Van Koppen (2005, 2012).

²⁰ It is far from obvious how such constructions are to be derived, as was first noted in a one-page squib by Perlmutter & Ross (1970). See Hoeksema (1986) for a more elaborate discussion, and Zhang (2007, 2010) and McKinney-Bock (2013) for more recent proposals and further references. Notice also that a comparable problem shows up even in seemingly simple cases as (i), called *hydrae* by Link (1984). Since the relative clause semantically intersects with the noun (phrase) below the level of the determiner, the expected configuration is (ii) – also acceptable –, where nominal properties can be conjoined at the right level, as indicated with subscripts. In (i), the intervening determiner creates the problematic split.

(i) the boy_i and the girl_j *who*_{i+j} met yesterday
 (ii) the [[boy_i and girl_j]_k *who*_{k=i+j} met yesterday]

²¹ See Kluck & De Vries (2013) for related data from Dutch, and further discussion. In the type of example in (78), RNR is preceded by extraposition.

Notice that on a more neutral intonation, there is a salient alternative reading in which the relative clause is related to *a woman* only; in that case there is no split antecedent at all. Other factors to consider, likely also reflected in the intonation, are the mode of construal of both the relative clause and the second conjunct. The former can alternatively be interpreted appositively, and the conjoined clause can be construed as a parenthetical. A study in which all these complications are carefully sorted out is still due.

To complete the puzzle, it is also possible to create a crossing one-to-one dependency for some speakers (cf. Dougherty 1969), as in (79). Note that such data are considered unacceptable by many others (see also George 1980: 120ff for discussion).

- (79) % Peter admires, and Mike worships, Susan and Anne, respectively.
intended: ‘Peter admires Susan, and Mike worships Anne.’

Superficially, the examples in (80a/b) involve a similar configuration. However, the simple example in (80c) suggests that the issue of matching the separate actions with the right individuals is pragmatic rather than syntactic or semantic in these cases:

- (80) a. % I saw a man in the house and I saw a woman in the garden who were chewing gum and drinking coke, respectively.
 b. A man and a woman were chewing gum and drinking coke, respectively.
 c. They were chewing gum and drinking coke, respectively.

Here, *who*, *a man and a woman*, and *they* all represent a plural subject. By contrast, *Peter* and *Mike* in (79) are not combined into a plural, so a complex form of RNR is called for.²²

In case of a split antecedent as in (77), the two antecedents are not directly coordinated to each other; still, there is coordination at a higher level. This raises the question of whether this is required. The following examples suggest that this is not the case. In (81a), the silent PRO can take split antecedents that are in a c-command configuration for many speakers, very much comparable to what a personal pronoun can do (81b), depending on binding conditions; similarly, the relative pronoun in (81c) can relate to a combination of noun phrases:

- (81) a. % *Peter_i* proposed to *Susan_j* to PRO_{*i+j*} go to the cinema together.
 b. *Peter_i* said to *Susan_j* that they_{*i+j*} could go to the cinema together.
 c. % *A man_i* kissed *a woman_i* yesterday who_{*i+j*} actually hated each other.

The simple generalization seems to be that every *pro*-form can pick up any salient information of the right type as its antecedent, split or not, and that this has nothing to do with syntactic coordination *per se*. The additional difficulty in (81c) and (77/78) is that the relative clause acts as a restriction on the interpretation of (each of) the nominal antecedents.

The issue of split dependencies is even broader than indicated so far. In (82) and (83), the result clauses and comparative clauses depend on split degree terms.²³ See also Chomsky (1981:81ff) for some discussion.

- (82) a. Peter is *so* tall and Susan is *so* small [that they can hardly look each other straight in the eye].
 b. *So* many thieves stole *so* many diamonds each [that the insurance could not possibly cover the loss].

²² See Park (2005), De Vos & Vicente (2005), and Zhang (2010) for related proposals.

²³ Evidently, such examples are problematic if the clause is to be generated within the maximal projection of the degree element. See Rijkhoek (1998) for an alternative approach.

- (83) a. *More* boys wanted to sing and *more* girls wanted to dance [than there were places in the joint competition].
 b. *More* students asked *more* questions about *more* topics to *more* professors on the panel [than the organizers had imagined in their wildest dreams].

As before, it does not seem to matter whether these terms are embedded in coordinated clauses or not.

4. Conclusion

Across-the-board phenomena in the broad sense of one-to-many and many-to-one relationships are surprisingly widespread throughout the language system. Whether or not a particular construction type is to be characterized as ‘true’ ATB ultimately depends on the precise analysis of the construction as well as the definition and theory of ATB itself. While there is a common trait to ATB and ATB-like constructions, it seems improbable that a generalized analysis can cover all of them. A number of different classes may be distinguished. First, there is ATB extraction from coordinate structures. These encompass any kind of leftward movement simultaneously from more than one conjunct. A, A’ and head movement are all attested, and there is no obvious limitation with respect to categorial status. Second, multiple extraction from subordination contexts is possible; these include parasitic gap configurations. Third, ellipsis phenomena, forward and backward in different ways, share some properties with ATB extractions. Fourth, binding of pronouns may involve multiple dependencies. Fifth, in inverse fashion, this may result in split antecedent phenomena. Sixth, Case and agreement patterns often target multiple conjuncts.

ATB was originally presented as an exception to the coordinate structure constraint. There seems to be a growing consensus that the CSC cannot be part of syntax, and hence that coordinate structures are not inherent syntactic islands. ATB as well as extractions from semantically asymmetric coordinations are then no longer exceptions to a constraint. The remaining effect of the CSC comes down to a certain parallelism requirement concerning ‘symmetrical’ coordination, which may be a semantic effect. In these structures, and only there, extraction must take place from all conjuncts. Similarly, forward and backward ellipsis necessarily targets all conjuncts save the first or last where the antecedent resides. However, no such demand exists for binding of pronouns inside a coordination phrase. Other potential parallelism constraints have been discussed in the literature, but none are really robust. A related issue is the so-called (referential) identity requirement in ATB constructions, which was shown to be invalid here.

It appears to be a given that the grammar allows for multiple dependencies, as is especially clear from multiple binding inside and outside coordination contexts. But this alone is insufficient to explain ATB extraction in a transformational framework. There are basically two approaches. The first states that only the movement from the first base position is real, the other gaps involve a coreferent operator or silent pronoun. While this is a feasible way to go, it is somewhat disconcerting that there is little convincing evidence for such an asymmetrical configuration; moreover, the empty elements need to be justified. The alternative involves structure sharing and/or sideward movement – if one accepts that such theoretical options are independently available. Such analyses directly reflect the intuitive symmetry of the configuration, but they face some problems of execution as well. Notably, both approaches can easily generalize over regular ATB in coordinate structures and parasitic gaps. The old question of whether parasitic gaps are to be reduced to ATB or vice versa is an inadequate way of framing the issue. It is likely that a common mechanism underlies (apparent) multiple extraction – but it is still necessary to explain the differences in behavior (to the extent they are real), plausibly in terms of the different configuration in which the mechanism is applied.

Evidently, a full evaluation of all existing theoretical approaches in the light of all available data is impossible within the limits of this chapter, and might even be considered unjustified from a historical perspective. Nevertheless, for future progress in the study of ATB phenomena it may be fruitful to continue theoretical developments with an eye on the expanded empirical basis along the lines indicated here.

Cross-References

See also Asymmetric Coordination, Conjoined *Wh*-Questions, Parasitic Gaps, Right Node Raising

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