An investigation of apparent sub-lexical coordination in English

Clara Sherley-Appel
csherley@ucsc.edu

Jesse Zymet
jzymet@ucla.edu

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1 Introduction

This talk concerns itself with constructions like those in (1):

(1)  a. pro- or anti-gun control  
    b. pre- or post-syntactic  
    c. ortho- and periodontists  
    d. macro- or micro-organisms

It has often been assumed that these data exemplify coordination below the level of the word (Quirk et al. 1985; Huddleston et al. 2002; Artstein 2005). Alternately, such constructions have been argued to instantiate word-part ellipsis (Booij 1985; Hartmann 2000; Chaves 2008).

In this talk, we argue that both the sublexical coordination account and the word-part ellipsis account fail to capture the full range of data. Consider the examples in (2):

(2)  a. Did you order the hard- or the soft-cover edition?  
    b. It’s the difference between a five- and a ten-minute therapy session.  
    c. His illusions are usually one- or at best two-sided.  
    d. This is either a second- or a third-hand copy of the tape.  
    e. These events took place in pre- or in post-war Germany?  
    f. We can use either un- or completely oversalted dough.

For at least these cases, we argue that an analysis of apparent sublexical coordination as right-node raising is preferable to either an affix coordination or an ellipsis account. The structure of the talk is as follows:

- Section 2 details the distribution of apparent sublexical coordination (ASC), with particular attention to the prosodic/phonological features constraining their distribution,
- Section 3 demonstrates the failure of the affix coordination account to capture the data in (2),
- Section 4 presents key features of two subclasses of ellipsis (NPE/VPE/Sluicing and gapping/stripping) and contrasts these with features of ASC, and
- Section 5 sketches a right-node raising analysis of ASC, following the intuitions of Wilder (1997), Sabbagh (2007), and others.
2 Distribution of ASC

Let us begin by observing a few facts about the distribution of ASC. The distribution of ASC does not appear to be limited to a particular syntactic category:

(3)  a. pre- and post-modern
     b. pro- and anti-liberation
     c. under- and over-generate

As the examples in (3) demonstrate, adjectival, nominal, and verbal ASCs may all be observed.

ASCs are also not limited to a particular area of the lexicon. While they are highly productive with Greek and Latinate affixes, we also find ASCs formed from Germanic word parts:

(4)  a. mis- or undiagnosed
     b. mis- or disinformation
     c. un- and retie
     d. de- and reactivate

ASCs are also not limited to function or lexical affixes. In addition to exemplars like those in (3) and (4), we also observe ASCs like those in (5):

(5)  a. thermo- or electrodynamc
     b. nucleo- or lipoproteins
     c. neuro- and psychophysiology

Evidently, ASC is a genuine, productive syntactic process of English, and not merely an idiomatic inheritance encoded in the lexicon.¹

At least three other facts are relevant to any discussion of the syntactic distribution of ASC. First, word parts in ASC need not be of the same size—i.e., ASC may involve "stacked" word parts, as in (6):

(6)  a. vice- and ex-vice-president
     b. nucleo- and para-nucleo-proteins

Secondly, ASC may occur in non-peripheral positions, modulo phonological and prosodic constraints on their formation. As a result, ASCs like (7) are licit:

(7)  anti-[dis- or re-]establishment

Finally, there is one way in which the syntactic distribution of these constructions is limited. While ASC is quite productive with category-preserving affixes, category-changing affixes do not participate:

(8)  a. *en- or dethrone
     b. *be- or unbewitched

However, this is plausibly a phonological fact rather than a syntactic one. Category-changing affixes often lack phonological independence—either they are heavily reliant on phonological context for their realization (8-a), or they are disinclined to receive word-level stress (8-b). It is clear that ASC is only possible when

¹In fact, ASC has been observed in many other languages as well. We will limit our discussion to English for simplicity's sake; however, a survey of the relevant literature on ASC outside of English may be found in Chaves (2008).
word parts have some measure of phonological independence. As observed in Artstein (2005) and Chaves (2008), for example, foot structure places a significant role in licensing ASC. Consider the contrast between the examples in (9) and the examples in (10):

(9)  
   a. *physio- and psychology  
   b. *ethno- and anthropology  
   c. *thermo- and barometer

(10)  
   a. physio- and psychological  
   b. ethno- and anthropological  
   c. thermo- and barometrical

Prosodically, the illicit coordinations in (9) are structurally distinct from the licit coordinations in (10).

- in the grammatical examples, there is a foot boundary between the coordinate word parts and the non-coordinate word part
- in the ungrammatical examples, the coordinate word part shares a foot with the non-coordinate word part

This is illustrated for the (a) examples in (11):

(11)  
   a. (f.ti)(‘a.la)čži  
   b. (f.ti)čž(a.la)kl

Footing cannot explain the impropriety of the ASCs in (8); however, it does provide the basis for putting the prohibition on category-changing ASC in phonological terms. And in fact, we see evidence in support of such an explanation from category-preserving affixes that behave phonologically like the category-changing affixes in (8):

(12)  
   a. *in- or non-invariant  
   b. *im- or unimpartial  
   c. *il- and non-illegitimate

While syntactically, the distribution of ASC is fairly free, licensing is evidently reliant on a certain degree of phonological independence of word parts.

3 ASC is not coordination of word-parts

Artstein (2005) claims that apparent sublexical coordinations must be interpreted at surface—i.e., that coordination of word parts is more than apparent. The basis for this claim comes from the following observation concerning plural interpretation in ASC:

(13)  
   a. Bill and Martha are ortho- and periodontists.  
   b. Bill and Martha are orthodontists and periodontists.

Artstein observes a difference between the readings that are available in (13-a) and (13-b). Specifically,

- the multitalented reading (where Bill practices as an orthodontist and as a periodontist, and so does Martha) is available for both (13-a) and (13-b), but
- the distributive reading (where Bill is an orthodontist and Martha is a periodontist) is only available for (13-a), not for (13-b)

This is taken to indicate the absence of a second plural morpheme inside the coordinate structure.²

² There is another option which Artstein does not consider, where the coordinate structure is orthodontist and periodontist, with the plural morpheme -s attached outside it. This is not incompatible with a right-node raising account, and may help explain some of
The sub-word coordination analysis is certainly available for (13-a). However, there is evidence that at least some ASCs involve discontinuous syntactic structure, eliminating a pure coordination account.

First, ASCs exist in which each coordinate contains an adjunct, as in (15):

(15)  a. The nurses at St. Vincent’s provide excellent pre- and superior post-natal care.
     b. We demonstrated rapid purification of homo- and new hetero-oligonucleotide tiles.

The modifiers superior and new in (15) are not modifying post- and hetero-, but rather post-natal care and hetero-oligonucleotide tiles. Under the sub-word coordination account, however, the only attachment site available is within the coordination:

(16)

To achieve the correct interpretation, these modifiers must be adjoined higher, as in (17):

(17)  a. AP superior AP post-natal NP care
     b. AP new NP hetero-oligonucleotide tiles

A similar problem arises when we consider examples like the ones in (18), below:

(18)  a. We will explore the pre- and the post-syntactic domains in this paper.
     b. There are ten bi- and twenty tri-fold brochures on the table.

There is no viable analysis of the pre- and the post- or ten bi- and twenty tri- in which they are syntactic constituents independent of syntactic domains and brochures. To maintain a simple coordination analysis, we would have to adopt a representation like (19) for the pre- and the post-syntactic domains:

the plural interpretation data Artstein observes.
In light of examples like (15) and (18), the a unified sub-word coordination account cannot be maintained. In the next sections, we will entertain two possible analyses of these data.

4 ASC is not ellipsis

Chaves (2008) argues forcefully that ASC is a type of backward ellipsis, and that by incorporating an account of ellipsis like the one in Chaves and Sag (2007), we can explain a number of important empirical facts concerning phonological, syntactic, and semantic restrictions on ASC. In particular, . . .

While these insights are important, we feel that ASC and ellipsis diverge with respect to several key empirical properties. As such, ASC should instead be treated as a type of right-node raising.3

A major hallmark of ellipsis is its ability to occur across clauses, across sentences, and across speakers, as the examples below illustrate:

(20) S1: Do you know who took John’s sandwich from the fridge?  
     S2: Well, I saw Sally eating a sandwich and I’m pretty sure it was John’s [sandwich]. (NPE)

(21) S1: Are you gonna go?  
     S2: Yeah, I am [gonna go]. (VPE)

(22) S1: I think John ordered the chicken.  
     S2: And Mary [ordered] the fish? (Gapping)

(23) S1: Nora plays a mean game of chess.  
     S2: Jim [plays a mean game of chess], too. They’re well-matched. (Stripping)

ASC, in contrast, is highly local. Attempts to license it at a distance are either degraded or completely ungrammatical:4

(24) S1: *Did the technician remember to de-?  
     S2: Yes, but he forgot to reactivate the device.  
     S1: *The pre- at this hospital is excellent.  
     S2: And so is the post-natal care.

3Wilder (1997), Hartmann (2000), and Barros and Vicente (2011), among others, argue that right-node raising constructions—or at least some subset of right-node raising constructions—are best accounted for as backward ellipsis. Chaves (2008) takes this as a basic assumption, and sketches a unified approach for what he terms ‘left peripheral ellipsis’ (which minimally encompasses Gapping and NPE) and ‘right peripheral ellipsis’ (right-node raising). We do not concern ourselves with the details of his analysis, nor do we argue that an ellipsis account is unavailable for all right-node raising constructions. Instead, we will focus on the empirical hallmarks of ellipsis.

4Given that ellipsis requires a linguistic antecedent (as observed in, e.g., Hankamer and Sag 1976), one might argue that the problem with licensing such constructions at a distance is a consequence of directionality.
As observed by Barros and Vicente (2011), ellipsis allows morphosyntactic mismatches, as long as they are not accompanied by changes in meaning:

(25)  a. Alice sleeps in her office, but Bob does not [sleep in his office].
     b. Alice just went on vacation, and Bob is about to [go on vacation].  (VPE)

(26)  a. Martina works all the time, and you [work all the time], too.
     b. John is reviewing my paper, not you [are reviewing my paper].  (Stripping)

While such mismatches are allowed in full coordinations, they are not licensed under ASC:

(27)  a. The technician deactivated the device, but didn’t reactivate the device.
     b. *The technician de-[activated], but didn’t reactivate the device.
     c. *The technician de-[activated], and will reactivate the device.

The final point concerns directionality. Outside of coordination, ellipsis is generally bidirectional:

(28)  a. Harvey can’t fix the faucet, so we’ll have to hire a plumber who can [fix the faucet].
     b. Harvey can’t [fix the faucet], so we’ll have to hire a plumber who can fix the faucet.

(29)  a. If John eats Sally’s sandwich, Sally will eat John’s [sandwich].
     b. If John eat’s Sally’s [sandwich], Sally will eat John’s sandwich.

(30)  a. I know that someone is here, but I don’t know who [is here].
     b. I don’t know who [is here], but I know that someone is here.

Ellipsis inside coordinations, in contrast, is typically unidirectional. Gapping always proceeds forward, with the antecedent preceding the elided constituent:

(31)  a. John ordered the chicken, and Mary [ordered] the fish.
     b. *John [ordered] the chicken, and Mary ordered the fish.

The same holds of Stripping:

(32)  a. Genevieve is extremely talented, and Mary [is extremely talented], too.
     b. *Genevieve [is extremely talented], too, and Mary is extremely talented.

ASC is also unidirectional, but the directionality is reversed—the antecedent always follows the elided constituent:

(33)  a. This hospital provides excellent pre- and post-natal care.
     b. *This hospital provides excellent pre-natal and post- care.
     c. Technicians de- and reactivate each device before it leaves the factory.
     d. *Technicians deactivate and re- each device before it leaves the factory.

If ASC is ellipsis, it is highly unusual. Though any one of these differences might be attributed to independent properties of ASC, as compared to phrasal ellipsis, accounting for all of them would require a great deal of stipulation. Moreover, it is not possible to rule out the examples in (24), (27), or (33) on the basis of phonological or semantic/pragmatic constraints—the differences between the ASC cases and the phrasal ellipsis cases are purely syntactic. This makes a unified syntactic account of phrasal ellipsis and ASC like the one proposed by Chaves (2008) untenable.
5 ASC as right-node raising

In light of the arguments against both the pure coordination and the ellipsis approaches, we propose an analysis of ASC in terms of right-node raising. Following Ross (1967) and Sabbagh (2007), we adopt a view of right-node raising as rightward ATB movement. In particular, RNR simultaneously raises identical targets in two or more conjuncts to the right edge of the coordinate structure:

\[(34) \quad \text{XP} \quad \text{XP} \quad A \quad \text{XP} \quad \text{XP} \quad \text{and} \quad \text{XP} \quad \text{XP} \quad \ldots A \quad \ldots A \]

This is a very slight departure from Sabbagh (2007), in which it is argued that movement proceeds directly to the right edge of CP. Sabbagh motivates the longer movement to explain certain scope facts about right-node raising generally. He observes a difference in the availability of wide scope reading of the universal in right-node raising constructions and full coordinations, as illustrated by the examples in (35):

\[(35) \quad \begin{align*}
\text{a. } & \text{Some nurse gave a flu shot to } \underline{x}, \text{ and administered a blood test for } \underline{x}, \text{ every patient.} \\
& (\exists \gg \forall, \forall \gg \exists) \\
\text{b. } & \text{Some nurse gave a flu shot to every patient and administered a blood test for every patient.} \\
& (\exists \gg \forall, \forall \gg \exists)
\end{align*} \]

In (35-a), but not (35-b), it is possible to get a reading where the universal takes scope over the existential, producing the interpretation “for every patient x, some nurse gave a shot to x and administered a blood test to x.” In RNR constructions, Sabbagh argues, wide scope of the universal quantifier is licensed because the universal moves to a position above the existential.

\[(36) \quad \begin{align*}
\text{[[Some nurse [[gave a flu shot to }
\text{every patient]_{vP} \text{ and [administered a blood test for every patient]_{vP}]_{TP}]}_{CP}
\text{every patient.}}
\end{align*} \]

In-situ accounts relying on ellipsis or multidominance cannot explain the difference between (35-a) and (35-b), because the universal never leaves the coordinate structure.

\[(37) \quad \begin{align*}
\text{[[Some nurse [[gave a flu shot to every patient]_{vP} \text{ and [administered a blood test for every patient]_{vP}]_{TP}]}_{CP}}
\end{align*} \]

In ellipsis, the universal is never left alone in the coordinate structure. Right-node raising attempts that violate the RCC are illicit.

There are two possible ways to proceed from here: either RNR always necessarily involves movement...
Clara Sherley-Appel  
Jesse Zymet

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to right-adjoin to CP, and the rare cases in which RNR results in a structure that appears to violate the RCC do so only superficially (Sabbagh’s contention), or RNR is always bounded, but licenses further movement as long as the RCC is not violated.

The difference is trivial in standard right-node raising cases inside of sentence-final PPs or vPs, but consequential with ASC since ASC can occur sentence-initially, inside DPs.

(39) a. The ortho- and the periodontists in this dental practice are excellent.

b. The museum’s excellent pre- and superb post-modern art collections have been expanded.

These cases are clearly bounded, but also licit. If right-node raising is ATB movement that right-adjoins the target to CP, we cannot account for examples like (39). On the other hand, if RNR is bounded ATB movement to the right edge of the coordinate structure (as initially proposed by Ross 1967) and simply feeds further movement,5 we have a straightforward explanation. For the ortho- and the periodontists, the derivation works as in (40):

(40) the ortho- and the periodontists

Following Sabbagh, adjectival and verbal ASC simply involve multiple applications of right-node raising. The right-edge restriction in (41) is derived in his system as a condition on PF linearization:

(41) THE RIGHT EDGE RESTRICTION
In the configuration:

\[
\begin{array}{c}
[A \ldots X \ldots] \text{Conj.} \ [B \ldots X \ldots]
\end{array}
\]

X must be rightmost within A and B before either (i) X can be deleted from A; (ii) X can be rightward ATB-moved; or (iii) X can be multiply dominated by A and B.

5There is some precedent for this view: Abels (2004) develops an account which treats right-node raising as ellipsis that feeds leftward ATB movement.
This enforces an order of operations: the rightmost element in the coordinate structure raises first, and in subsequent applications of right-node raising, the target tucks-in underneath previously moved constituents in obeisance to the RCC.

example

6 Summary and conclusions

To summarize our investigation so far, we have demonstrated that the empirical evidence favors a view of ASC as right-node raising over alternatives in which it is treated as sub-word coordination or as ellipsis.

say more

7 Acknowledgements

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