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The coordination particle

1 Introduction

This paper continues previous work by Newson & Gáspár (2001a, 2001b, 2002—henceforth Newson & Gáspár), which deals with ellipsis in coordinate expressions. The focus of the present paper is not however on ellipsis, but on questions concerning the form of coordination, elided or not, with particular emphasis on the distribution of the coordination particle (*and, or, but* etc.) across languages.

In the following section I will briefly introduce the framework I will adopt (essentially that of Newson & Gáspár). I will then proceed to the analysis. The section on the analysis is divided into four subsections which concern my claims about the nature of the coordination particle, a review of the linguistic variation concerning this element, the actual analysis in terms of alignment constraints and finally a brief look at languages which do not always represent the coordination particle overtly.

2 The framework

The framework that I adopt is a very restrictive version of OT, though it incorporates many standard features. The restriction lies mainly in the evaluation, in that it is assumed that this consists only of alignment and faithfulness constraints.

As is standard, I assume that the input consists of a set of lexical selections plus a number of feature assignments. These feature assignments concern tokens taken from the argument structure of the predicates included in the input (thematic roles), markers of grammatical function (i.e., subject) and markers of information status (topic and focus).[1] Thematic and information features are assigned randomly to arguments and determine how these arguments are to be interpreted: a different feature assignment constitutes a different input. The grammatical function feature, however, is

[1] In the inputs presented below, the thematic features are represented as x and y, where x denotes a more prominent thematic role than y, and the subject feature is given as *sub*. Examples including information features are not considered in this paper.

assigned to the argument which is assigned the most prominent thematic feature of a predicate, where prominence is determined in terms of a universal thematic hierarchy (for some discussion of argument prominence, see Grimshaw 1990[2]). Assuming that it is the input and not the generated expression that feeds the semantic interpretation, the question of the "correctness" of feature assignments, as well as that of the lexical selection, reduce to conditions on interpretability. It is only interpretable inputs that we need be concerned with.

The question of which expressions compete for grammaticality is much simplified under the restrictive assumptions I will be making. I assume that GEN is a simple linearisation procedure which produces all the possible linear orderings of the input elements. Moreover, any assigned feature may be the target of underparsing and thus candidate expressions will also differ in terms of which input features are present or absent. Notice that under these assumptions the candidate set is finite.

The evaluation component of the grammar contains constraints which are violable and ranked in accordance with the normal OT view. However, as mentioned above, I will assume that this part of the grammar contains only alignment and faithfulness constraints. The alignment constraints are gradient constraints, violable to different degrees, which favour candidate expressions in which certain elements are adjacent to (aligned with) each other. Typically alignments concern feature bearing elements (e.g., subjects, topics, etc.) which are aligned with respect to a "core" element: the head. In this paper I will assume that the predicate is the head of the clause. For every alignment pair (subject/predicate, topic/predicate etc.) there is a left and a right alignment, the ranking of which with respect to each other and with respect to the other constraints will determine on which side of the head an aligned element will come and how near to the head it will be. Note the indication here that there are two ways to violate an alignment constraint: (i) the aligned element may be on the wrong side of the head, something we will refer to as a *side violation* and represent in tables with "★"; (ii) the aligned element may be on the right side of the head, but not

[2] Grimshaw determines the notion of argument prominence in terms of two hierarchies, a thematic one (agent > experiencer > obliques > theme) and an aspectual one (arguments associated with prior events > arguments associated with resulting events/states). For Grimshaw, the notion of external argument is defined as the argument which is most prominent on both hierarchies. If there is conflict between the two, then the notion remains undefined for that predicate. However, following Newson (1999), I will assume that for the assignment of the *sub* feature conflicts are resolved by giving the aspectual hierarchy priority over the thematic one.

adjacent to it, which we will refer to as an *edge violation* and mark with the standard "∗". The important assumption is that one side violation is worse than any amount of edge violations.

Under these assumptions the grammar has no cause to refer to structure; it simply considers which elements are aligned to which others in a linearly organised expression (Newson 2000). Structure, if it has any reality in syntax, is epiphenominal.

The one faithfulness constraint I will assume in this paper is PARSE: a constraint against underparsing. Filling syntactic positions with non-input elements is not part of the present system. This has the effect of both restricting the types of constraints made use of as well as maintaining a finite candidate set. If candidates expressions are allowed to differ through the insertion of non-input material, then obviously the candidate set would be potentially infinitely large. As underparsing has a limit, i.e., the null candidate, this process can only increase the candidate set finitely.[3]

Newson & Gáspár take coordination to be marked in an input by the presence of a coordinator which is "predicate"-like, determining a number of "argument" slots to which it assigns coordination features. An input involving a coordination may therefore look like the following:

(1)
$$\begin{bmatrix} \& & & \\ \text{x}=\text{arrived} & & \\ & \text{x} & =\text{sub}=\text{John} \\ \text{y}=\text{fainted} & & \\ & \text{x} & =\text{sub}=\text{Mary} \end{bmatrix}$$

[3] There may be a way to include a very limited amount of insertion of non-input material under the assumption of a "split-lexicon" in the manner of the Distributed Morphology model (Hale & Maranz 1993). From this perspective what is in the input is a set of abstract lexical elements, consisting of bundles of syntactic and semantic features, which may or may not correspond to any particular phonological word of the language. Once the optimal arrangement of these abstract lexical elements is determined, then the expression can be "spelled out" with words from the phonological lexicon on a "best fit" basis. Suppose that the best fitting phonological word for spelling out a certain abstract lexical element is one which is associated with more features than the element to be spelled out. For example, it may be that the phonological word *do* happens to be the best way to spell out an abstract verb which has grammatical but no semantic features, borrowing an idea from Grimshaw (1997). In this case there would appear to be non-input material inserted into an expression though this would obviously be limited by the choice of phonological words in the lexicon.

Note that it is assumed that what is marked as coordinated in the input are predicates, not phrases or clauses. This must be so as such elements do not exist in the input.[4]

A non-standard feature of the evaluation in the present system is that it is cyclical. Standardly it is assumed that the entire candidate set is evaluated on a single run through the ranked constraints, each (surviving) candidate being evaluated against others in terms of its sum performance with respect to each constraint in turn. Each constraint imposes limitations on the surviving candidates until the candidate set is reduced to the optimal one(s). The idea of cyclicity is that candidate expressions can be evaluated not in their entirety but more selectively, concentrating on specific aspects of their organisation; a different aspect for each cycle. On each cycle the candidate set is decreased and the surviving candidates form the starting set for evaluation on the next cycle.

What cyclicity does is to prioritise the satisfaction of constraint conditions for certain aspects of candidate expressions. For example, if we assume that the requirements of superordinate predicates are attended to in the first cycle and the successively subordinated predicates in subsequent cycles, then constraint conditions may be satisfied for superordinate predicates at the expense of forcing subordinate predicates to violate them. A subject may be raised to satisfy the requirements of a higher predicate at the expense of forcing the lower one to violate exactly the same condition.

The candidates which survive a cycle will all be similar in that they are optimally arranged with respect to whatever was the focus of that cycle and any previous ones. However, they will differ precisely in terms of those aspects not yet considered. Given that on each cycle candidates are eliminated, it follows that the later cycles will have fewer opportunities to satisfy the constraint requirements, but as is standard in OT, the best satisfaction of these conditions, given prior limitations, will be grammatical.

In Newson & Gáspár, this idea was utilised to give an analysis of ellipsis in coordinate structures. Two cycles are assumed: the predicate cycle and the coordination cycle. In the predicate cycle, the requirements of specific arguments and predicates thematically related in the input are

[4] The semantics may interpret such an input as representing a coordination of propositions, taking the predicate to be the semantic head of the proposition, not at all an unusual assumption. As we will see, in the syntax, as no structure is assumed and hence there are no phrases or clauses, it is predicates which are coordinated, in the sense that these are ordered with respect to each other by the coordination alignment constraints.

attended to. Thus in this cycle related arguments and predicates will be sorted into their alignment positions. When coordination is involved, the relationship between coordinated predicates will not be attended to in the predicate cycle as this relation is not thematic. Thus in effect each of the conjuncts will be evaluated in this cycle as though they are independent of each other and the result will be that only candidates in which the relevant arguments are properly aligned to their predicates in each conjunct will emerge from this cycle. However, the order of the conjuncts themselves will not be fixed and neither will the position of the coordination particle. Therefore candidates surviving this cycle will differ exactly in these respects. It is up to the coordination cycle to determine which of these candidates is optimally organised.

To give a simple example, I introduce two alignments here: one which aligns the subject to the right or left of its predicate (Sp/pS) and one which aligns arguments to the right or left of the predicate (Ap/pA). For English given that the subject precedes and other arguments follow the predicate, the ranking of the constraints is as in (2):[5]

(2) Sp > pA > pS , Ap

Now consider a simple input involving coordination, such as in (1). Ignoring the issue of the coordination particle for the moment, as there are four input elements, there will be 12 possible orderings of these, which constitute the candidate set.[6] In the predicate cycle the specific thematic relationships stated in the input are attended to and each subject is forced in front of its predicate. However, the predicates themselves will be unordered with respect to each other:[7]

[5] For this simplified demonstration the ranking of the pS and Ap constraints is unimportant. This does not mean to say that it would be unimportant if we were to consider further phenomena.

[6] As it is not relevant for English, we also ignore here the possibility of feature underparsing.

[7] In the following table for convenience I have represented non-optimal candidates in terms of their types, i.e., whether subjects are separated from their predicates by other input material or the subject is on the wrong side of its predicate (e.g., *John Mary fainted arrived* or *John arrived, fainted Mary*). The three dots in candidate expressions represent the possible positions of the other input material. The dots in the columns under the constraints represent different degrees of violation depending on the exact arrangement of the other input elements in the candidate.

(3)

	PREDICATE CYCLE	Sp	pA	pS	Ap
☞	John arrived, Mary fainted		★★	★★	
☞	Mary fainted, John arrived		★★	★★	
	… John … arrived …	∗…!	★…	★…	∗…
	… arrived John …	★…!	…	…	★…
	… Mary … fainted …	∗…!	★…	★…	∗…
	… fainted Mary …	★…!	…	…	★…

As can be seen, what emerges from this cycle are the two candidates in which the two conjuncts are individually properly organised, but unordered with respect to each other. In this particular case, the coordination cycle will not select between these two candidates either and so both will emerge as optimal and therefore grammatical. The assumption is that coordination is a symmetrical relationship and thus under normal circumstances there can be no way to fix the order of conjuncts. Therefore, all else being equal, the order of the conjuncts will remain unfixed[8] (in elliptical cases all else is not equal and hence an order on the conjuncts will be imposed — see Newson & Gáspár for details).

The relationship between the coordination particle and the conjuncts is also not thematic and hence this will not be dealt with in the predicate cycle. Given that we start with a candidate set consisting of all the possible linear arrangements of the input elements (and all possible under parsing of their features) and that the predicate cycle will fix the order of elements within the conjuncts, entering the coordination cycle will be those candidates in which the coordination particle appears in all possible juxtapositions with respect to the conjuncts. In the coordination cycle, therefore, the order of the coordination particle with respect to the conjuncts must be fixed. We now turn to the issue of how this can be done.

[8] We take a fairly standard view on sequencing effects seen in certain cases of coordination, as in *John drank the poison and John died,* for example, claiming this to be pragmatic in nature, lying outside the scope of our considerations.

3 The analysis

3.1 The nature of the coordination particle

The most obvious treatment of the coordination particle is to take it as representing the input coordination element itself. Two observations argue in favour of this. First, the particle is used to distinguish different types of coordination:

(4) a. John arrived and Mary fainted
 b. stop or I'll shoot
 c. John fetched the drinks but Mary paid for them

Given that these differences are marked on the coordination element in the input, it would be straightforward to assume that the particle is simply an instantiation of this element. Secondly, as Borsley (1994) points out, the coordination particle has certain "head"-like properties. This fits well with our treatment of the coordination elements as an "argument" taking head in the input. One "head" property that the coordination particle has is that it tends to conform to the general head sidedness conditions of the language. Thus, if the language is basically head initial, the coordination particle can be analysed as being initial, in that it appears to be more closely associated with the conjunct that follows it, whereas in head final languages the particle is probably better analysed as being closely associated with the preceding conjunct. Thus, in English we can strand a coordination particle with a following conjunct, but not a preceding one and in Japanese in cases of multiple coordination marking, the particle obviously follows each conjunct:

(5) a. John is coming, and Mary/*Mary and
 b. taroo to akiko to wa nara e ikimashita
 Taro and Akiko and top Nara to went
 'both Taro and Akiko went to Nara' (Borsley 1994 : 224)

However, there are other reasons why it might not be wise to assume that coordination particles instantiate the input coordination element. One comes from observations such as (5b). Here, in the same coordination the particle appears more than once. Clearly there is only one coordination here as there are only two conjuncts. Neither is this unusual phenomena, as it can be found in a number of geographically and historically disperse languages:

(6) a. i Jan i Jerzy widzieli Marię
and Jan and Jerzy saw-m.pl Maria-acc.
'both John and Jerzy saw Mary' (Polish, Borsley 1994 : 241)

b. ke egho ke o petros to thelume
and I and the petros it want-1pl
'both Peter and I want it' (Greek, Johannessen 1998 : 91)

c. et ego et Cicero meus flagitabit
and I and Cicero my will-demand-3sg
'both I and my Cicero will demand (it)'
(Latin, Johannessen 1998 : 91)

d. et Jean et Marie sont allés au parc
and Jean and Marie were-3pl gone to the park
'both John and Mary have gone to the park'
(French, Gáspár 1999 : 2)

Even if these constructions are special in some way, in that they are used to intensify one or both of the conjuncts, as their English translation suggests, it would be clearly difficult to relate both appearances of the particle to a single input element. Instead, it seems the particle is to be seen more as part of the individual conjuncts, rather than as an independent element linking them. Further evidence to this effect is the fact that often the form of the coordination particle is dependent on properties of the conjuncts themselves. Johannessen (1998) reports that Nguan, a Melanesian language from the Central New Hebrides, coordinates VPs with *poo* and clauses with *go*:

(7) a. A ga vano poo tape na-peka seara
I non-past go and get yam some
'I go and get some yams'

b. eu munu na-maloku go eu sale poogi
they drink kava and they dance all night
'they drank kava and they danced all night' (Johannessen 1998 : 86)

Similarly Sissala, a Voltaic language, has a different coordination particle for sentence (*ká*), VP (*a*) and all other coordinations (*rí*):

(8) betúú coŋgoroŋ pérí mɛtrɛ bɛllɛ ká ú zíŋ má peri
elephant height reach meters two and his weight also reach
kíílό bui-ammuɔ
kilos thousand-five
'the elephant's height reaches two meters and his weight can also reach five thousand kilos'

(9) ɪ sisnyɛ siɛ tɔk niŋ a mú a coki yibuú ná a nyikɛ
you now so take fire and go and cut mound def and light
a ba yila viva
and cut mound walk
'you clear the mound place there and burn (the place). You now form the mounds while walking'

(10) pilɛkɛ rí wɔwúlɛnɛrɛ nɛ muɛ hé baksɛ
chameleon and spider went put farms
'the chameleon and the spider went and made their farms'
(Johannessen 1998 : 85)

From the present perspective it cannot be the category of the coordinated elements which are responsible for these differences as, at least for VP and clausal coordination, we assume that there are no categorial differences: both are cases of predicate coordination. However, there are differences in terms of ellipsis, which is what I assume is being marked here. A similar but more transparent case of this comes from Pitjantjatjara, an Australian language of the Western Desert Group, which encodes the referential properties of the subjects of coordinated clauses in the coordination particle:

(11) ka kunyu kuṯa panya kunkunpa ngari- ngi
and-ds rep older brother anaph sleep lie-past imp
ka kunyu tjitji panya paluṟu ngalya-pitja-ra ngari-kati-ngu
and-ds rep child anaph he back-come-ant lie-bring-past
munu kunyu ngari- ngi kunkunpa
and-ss rep lie-past imp sleep
'The elder brother was lying asleep and the child came back, lay down and (the child) was asleep' (Bowe 1990 : 96)

Of interest to us from this rather long example taken from a narrative is the use of the coordination particles *ka* and *munu*. The first is used when the following clause has a subject different to the previous one, as can be seen overtly in the first two conjuncts (*ku̲ta* and *tjitji* respectively). The conjunction *munu* is used when coordinated clauses have the same subjects, as can be seen in the last sequence of conjuncts. Here the subject of 'lay down' and 'was asleep' is covert, but its reference is the same as the subject of 'came back' because they are conjoined with *munu*. Thus in this case not only does the conjunction particle mark null material in the conjuncts, it also represents properties of the null material itself.

Whatever the analysis of these phenomena, the point remains that it is properties of the conjunctions that determine the form of the particle, which would be rather difficult to account for if we assumed that the particle is an instantiation of the independent coordination element.

The above properties are more easily captured if we take the coordination particle to simply be a marker of the coordinated status of the conjuncts, in a similar way to how a complementiser is a marker of the subordinated status of the clause it introduces. More accurately, given that we are assuming that it is predicates which are marked as coordinated in the input, I will take the coordination particle to be a marker of the coordination feature assigned to the predicate. In general, features assigned to an element in the input, if represented morphologically at all, can either be realised in terms of a bound or a free morpheme. For example, a negative feature can in English be realised as a free *not* or a bound *n't*. The subject feature assigned in the input to the most prominent argument can be realised in terms of an inflectional (case) morpheme, however, in some languages, notably Bantu, there is an obligatory pronoun which can be taken to be the realisation of the subject feature by a free morpheme. There are many cases of elements being represented morphologically in one language but by an independent word in another, for example much of what goes under the title of incorporation can be analysed along these lines. Obviously then this is a rather general "parameter" of variation between languages. I will assume, though not fully develop an account of the phenomena, that this variation has to do with how the feature gets instantiated in a candidate expression: "fused" with the element to which it is assigned or independent from it.[9] In the cases we are concerned with, the coordination particle is an independent realisation of the coordination feature assigned to a predicate. Of course, it has to conform to alignment conditions with respect

[9] Clearly, given the restriction to alignment constraints, the difference between the two cases has to do with whether the feature is morphologically or syntactically aligned. The difference is between whether or not the alignment condition sees elements internal to the lexical word.

to the predicate to which it is assigned. We will consider these alignment conditions after the following section.

3.2 Linguistic variation and the coordination particle

Cross-linguistically, we find the following variation concerning the positioning of the coordination particle:

(12) a. the coordination particle comes to the right or the left of the conjunct (predicate) which it marks;
b. the coordination particle marks all or only one of the conjuncts
c. the coordination particle, if it does not mark all of the conjuncts, marks the right-most or the left-most conjunct.

We have already exemplified the variation mentioned in (12a) referring to the difference between English and Japanese (see (4) and (5)). There we gave examples of nominal coordination, which will not concern us much in the rest of this paper. However, the same distinction seems to hold of "clausal" coordination too:

(13) John wa biru ga kirai de, Mary wa sukida
John top beer obj hates and Mary top loves
'John hates and Mary loves beer' (Newson & Gáspár)

That the coordination particle is attached to the first conjunct in the Japanese example is attested by the intonation pattern, which, as indicated by the comma, pauses after the particle. With clausal coordination in English, however, the pause tends to precede the coordination particle:

(14) John arrived, and Mary fainted

We have also seen examples of the second axis of variation when we showed that in some languages coordination can be marked on both conjuncts (see (6)). Other languages do not allow this possibility, for example English:

(15) *and John arrived and Mary fainted[10]

Of course, it is possible to have multiple instances of coordination particles in English sentences:

(16) John arrived and Mary fainted and Bill applauded

However, as Borsley (1994) points out such sentences have a very different organisation to those with just a single coordination particle. In a language like English, multiple coordination particles mean multiple coordinations. This can be demonstrated by the following contrast:

(17) a. John wrote the letter, Mary posted it and Bill received it on Tuesday
  b. John wrote the letter and Mary posted it and Bill received it on Tuesday

Note that (17a) is two ways ambiguous, with the adverbial *on Tuesday* either modifying all of the conjuncts, or just the last. Importantly, we cannot interpret this to mean that John wrote the letter, say, on Monday and that Mary posted it and Bill received it on Tuesday. However, this is a possible interpretation for (17b). Thus, only in (17b) can the last two conjuncts be interpreted as a semantic unit able to be modified as such. Similarly, consider the following:

(18) a. John wrote the letter, Mary posted it on Tuesday and Bill received it (on Wednesday)
  b. John wrote the letter and Mary posted it on Tuesday and Bill received it (on Wednesday)

[10] The examples of multiply marked coordination given in (6) all concern nominal coordination. I have not been able to confirm whether any of these languages allow multiply marked sentential coordination. If such reiteration of the coordination particle has the function of intensifying one or both of the conjuncts, then the fact that we can get examples such as (i) and (ii) which have the same intensifying effect suggests that multiply marked sentential coordination should at least be a possibility:

(i) either you have the money or you don't have it

(ii) both that John had seen Mary and that he had spoken to her were worrying

In (18a) the adverbial can only modify the immediately preceding conjunct and not the two preceding conjuncts together. This interpretation is however possible in (18b). What this indicates is that there are multiple coordinations in the (b) examples which give rise to an ambiguity in semantic structure. From the present perspective, this difference can be traced back to the organisation of the input. The (a) examples have an input of the pattern given in (19) in which there is one coordination, with multiple "arguments". The (b) examples have inputs of either of the patterns shown in (20) or (21), where coordinations are embedded.

(19) $\begin{bmatrix} \& \\ \text{x} = \text{wrote} \\ \quad \dots \\ \text{y} = \text{posted} \\ \quad \dots \\ \text{z} = \text{received} \\ \quad \dots \end{bmatrix}$ (20) $\begin{bmatrix} \& \\ \text{x} = \text{wrote} \\ \quad \dots \\ \text{y} = \& \\ \quad \text{x} = \text{posted} \\ \quad\quad \dots \\ \quad \text{y} = \text{received} \\ \quad\quad \dots \end{bmatrix}$ (21) $\begin{bmatrix} \& \\ \text{x} = \& \\ \quad \text{y} = \text{wrote} \\ \quad\quad \dots \\ \quad \text{x} = \text{posted} \\ \quad\quad \dots \\ \text{y} = \text{received} \\ \quad \dots \end{bmatrix}$

The conclusion is, therefore, that English only allows multiple coordination particles if there are multiple coordinations, with one particle marking one coordination.[11]

The final axis of variation, mentioned in (12c), has again already been exemplified. Compare the Japanese and English examples in (13) and (14) once more.

(13) John wa biru ga kirai de, Mary wa sukida
John top beer obj hates and Mary top loves
'John hates and Mary loves beer'

(14) John arrived, and Mary fainted

In Japanese, the coordination marked conjunct precedes the one which is unmarked, whereas in English it is the unmarked one which precedes the marked one:

[11] This situation is very similar to that which holds in negative contexts where languages either have multiple marking of a single negation, known as negative concord, or a single marking for every negation, known as double negation. See Newson 1998.

(22) a. *John wa biru ga kirai Mary wa sukida de
b. *and John arrived Mary fainted

3.3 Candidates and alignments

Let us take a hypothetical example concerning a coordination of two predicates heading propositions which we will denote P and Q. Assuming there to be no ellipsis in these, emerging from the predicate cycle will be those candidate expressions in which P and Q are each individually well formed sentences, but arranged in any order with respect to each other, as shown in (3). Moreover on the assumption that the predicate cycle does not consider the issue of the realisation of the coordinate feature assigned to each predicate, this will also remain unfixed. The possibilities are that neither, one or both features are marked and if they are marked the particle can be either to the left or the right of the marked conjunct. Bearing in mind that we are concerned with linearly arranged expressions, this gives 20 candidates entering the coordination cycle:

(23)	a. P Q	k. Q P
	b. & P Q	l. & Q P
	c. P & Q	m. Q & P
	d. P Q &	n. Q P &
	e. & & P Q	o. & & Q P
	f. & P & Q	p. & Q & P
	g. & P Q &	q. & Q P &
	h. P & & Q	r. Q & & P
	i. P & Q &	s. Q & P &
	j. P Q & &	t. Q P & &

Clearly the majority of these are ambiguous in terms of which conjunct is being marked by which particle. However, this ambiguity is not a problem for the evaluation of the candidates as each candidate will be evaluated in terms of its best satisfaction of the constraints. This follows from the fact that not only will the suboptimal analyses of the candidates never be optimal as they are harmonically bound by the optimal analyses, they will also never play a role in determining the optimal candidate by eliminating an otherwise even more optimal candidate, for example.[12] The suboptimal analyses of these candidates can therefore be safely ignored. What the best satisfaction of the constraints is will obviously depend on the ranking of the constraints. Under different rankings, different analyses of certain candidates may be relevant.

Given the range of variation amongst languages shown in (12) we need a system which will select candidates in terms of: which side of the conjunct the coordination particle comes; whether all or just one conjunction is marked by a particle and the order of the conjuncts when one is marked but not the other. The first of these is probably the most straightforward as it simply requires constraints which favour the coordination particle on the left or the right of its relevant conjunct. There is nothing particularly special about such an alignment:

(24) &p/p&: a coordination feature assigned to a predicate is to the left/ right of the predicate

Given that this constraint operates in the coordination cycle, after the predicate cycle, the nearest to the left or the right that the particle can be placed to its predicate is in front of or behind the "clause" headed by the predicate.

The next axis of variation concerns whether the coordination feature is realised or not on all conjuncts. Given that the case where the feature is not realised involves the underparsing of the feature, it is clear that the faithfulness constraint must be relevant here. However, this cannot be the whole story. Combining the faithfulness constraint with the two particle constraints in (24), we get six possible rankings giving rise to just three distinct language types, as three of the rankings produce the same result as some other ranking. The three language types are:

[12] The demonstration of this is simple enough. Suppose CON is the highest ranked constraint which differentiates between two candidates Can_{op} and Can_{sub}. The suboptimal candidate Can_{sub} cannot do better against any other candidate than Can_{op} with respect to any constraint ranked higher than CON as by assumption CON is the highest ranked constraint on which they are differentiated. Therefore any candidate which is beaten by Can_{sub} with respect to a constraint higher ranked than CON will also be beaten by Can_{op} an hence Can_{sub} has no effective role in determining the optimality of Can_{op}.

(25) a.	P Q	=(23a/k)	&p > p& > FAITH
			p& > &p > FAITH
b.	& P & Q	=(23f/p)	FAITH > &p > p&
			&p > FAITH > p&
c.	P & Q &	=(23i/s)	FAITH > p& > &p
			p& > FAITH > &p

When faithfulness is outranked by both alignment constraints it will be best never to realise the coordination feature given that whenever the particle is present it will violate one or the other alignment condition. Thus it will be better to be unfaithful than to put the particle on one side or the other of either conjunct. However, when the faithfulness constraint outranks at least one of the alignment constraints, it will be better to realise the coordination feature on both of the conjuncts. Which side the feature will be realised on is dependent on the relative ranking of the alignment constraints.

Besides the prediction that there can be languages in which coordination has no overt realisation, which we deal with separately in the following section, the obvious thing to note here is that languages in which coordination is marked on one conjunct but not the other are not predicted at all. This situation is rectified once we consider the third type of constraint at play in this system. The conjunct which is marked by the particle is either the left-most or right-most one. Clearly we do not want to say that this is a property of any particular conjunct, as we want to maintain that the conjuncts can come in any order, except those with an ellipsis. What we want to say is that regardless of the order of the actual conjuncts, the one that comes first (or last) will be marked with a coordination particle. We can capture this situation if we propose a constraint aligning coordination marked predicates to the left/right of the predicates that they are coordinated with:

(26) Mp/pM: a predicate with a coordination feature is aligned to the left/ right of the predicate(s) which it is coordinated to

Such constraints can only be fully satisfied if there is at most one of the predicates which has a coordination feature. If two predicates are marked as coordinated then one must come on the wrong side and Mp or pM will be violated.

As with the case of the coordination particle constraints, there is an interaction between the coordinated predicate constraints and faithfulness. If both the alignments are ranked above the faithfulness constraint, then once again, it will be better to be completely unfaithful and not mark either predicate as coordinated, rather than have one or the other alignment constraints violated. If both alignment constraints are dominated by the faithfulness constraint, abstracting away from the effects of the coordination particle constraint discussed above, then all conjuncts will have to be marked as coordinated and the coordinated predicate constraints will have to be violated. In fact, both constraints will be violated to exactly the same degree if all conjuncts are marked as coordinated as there will always be the same number of marked conjuncts to the left of the rightmost conjunct (in violation of pM) as there will be marked conjuncts to the right of the left-most one (in violation of Mp). This means that when outranked by the faithfulness constraint, these alignment constraints can have no role in determining grammaticality. However, when one is dominated by the faithfulness constraint but the other is not, then we get the pattern missing in the above discussion. The relatively high ranked faithfulness constraint will ensure that coordination will be marked where possible. However, the high ranked alignment will ensure that not all conjuncts can be marked. The optimal solution is to mark just one of the conjuncts, satisfying the alignment constraint fully, but not fully violating the faithfulness constraint. Obviously depending on which alignment constraint is ranked highest, the marked conjunct will either be to the right or to the left. Ignoring the coordination particle constraint for the moment, there are six possible rankings giving rise to three possible language types:[13]

[13] The orders shown in (27) are to be taken as schematic rather than actual candidate expressions as, by themselves, these alignment constraints do not determine the position of the coordination particle with respect to the conjunct that it marks. Thus Mp would evaluate:

(i) & P Q
(ii) P & Q
(iii) P Q &

as exactly the same with the particle taken as marking the first conjunct. Obviously the coordination particle constraint would select from these, discounting (iii) under any circumstances and selecting either (i) or (ii) depending on whether &p or p& is the higher ranked.

(27)	a.	P Q	Mp > pM > FAITH
			pM > Mp > FAITH
	b. i.	& P Q	Mp > FAITH > pM
	ii.	P Q &	pM > FAITH > Mp
	c.	& P & Q	FAITH > Mp > pM
			FAITH > pM > Mp

Putting all the constraints together, we find that there are three basic types of language predicted: those which do not mark coordination at all, those which mark one of the conjuncts, either the leftmost one or the rightmost one, with a particle which is either to the left or the right of the conjunct that it marks, and those which mark all conjuncts with a particle to the left or the right of each one:

(28)	a.		P Q
	b.	i.	& P Q
		ii./iii.	P & Q
		iv.	P Q &
	c.	i.	& P & Q
		ii.	P & Q &

It is not entirely clear that all these language types exist. The most obviously attested types are (28bii) and (28biii), which are not distinguished in the case of just two conjuncts, but are if there are more than two. We have seen examples of (28ci) and (28cii), but it is not clear that these exemplify language types or whether they are just possible constructions in some languages. Certainly, in all the languages reviewed above which allow (28c)-type expressions, they also allow (28bii/iii)-type expressions as well and moreover the (28c)-type expressions seem to be reserved for expressing special meanings in which one or both of the conjuncts are intensified in some way. If there are no languages which use these expressions exclusively, then perhaps the system developed here needs some modification to allow such expressions only under the right circumstances. At present, I have no suggestions as to how this can be done.

3.4 Zero marked coordination

In the last section of this paper, I want to turn attention to the possibility raised above that languages may not overtly mark coordination at all. Although they have not been exemplified so far in this paper, there are some languages which may fit this category, though not perfectly. Certainly, there are languages which do not mark all coordinate expressions with an overt coordination particle. However, these seem to come in a number of types.

First there are languages which seem to have zero marked coordination as an option along side overt marking. For example, Sissala alternates between zero marking and an a particle in cases of verbal conjunction and Scarsee alternates between overt and covert nominal coordination marking:

(29) ɪ sisnyɛ siɛ tɔk niŋ (a) mú (a) coki yibuú ná (a) nyikɛ
you now so take fire and go and cut mound def and light
(a) ba yila viva
and cut mound walk
'you clear the mound place there and burn (the place). You now form the mounds while walking' (Johannessen 1998 : 85)

(30) a. dítòò dóó-ʔï iná áání-là
own-father own-mother-det she told
'she told her own father and mother'
b. dítòò dóó ìhílà áásní-là-à
own-father own-mother and she-told
'she told her own father and mother' (Johannessen 1998 : 84)

In other languages there are no overt coordination particles for certain types of conjuncts, though they have overt particles for others. For example, Cayuga (Northern Iroquoian) has no marker for clausal, but it does for nominal coordination:

(31) a. neː' tshõː ne' onêhê' sahe'tá' hni' õkwayêthwê hneː'
it only the corn beans and we-planted contr
'no, we only planted corn and beans'
b. tho tshõː nheːyóht ake'tré' atkáːta'
there only so-it-is I-drove it-stopped
'I was only driving along and it stopped' (Johannessen 1998 : 85)

Finally, Johannessen (1998) reports that while languages may have covert coordination particles for conjunctive coordination, they often have overt particles expressing other types of coordination such as disjunctive and contrastive coordination. Unfortunately the examples she gives are less than ideal as they seem to be examples in which conjunctive coordination has an overt counterpart too. However, Chinese may be an example of such a language as it is typically accepted as having no conjunctive coordination particle for clauses, but it does have a disjunctive one:[14]

(32) wômen bù xiângyào érzi kêshi wô fùmû yíding yào ge sünzi
we not desire son but I parernt definitely want cl grandson
'we are not intent on a son, but my parents definitely want a grandson'
(T'ung & Pollard 1982 : 41)

The question is whether such languages represent examples of the predicted language type that through the low ranking of the faithfulness constraint fails to realise the coordination feature. The answer is probably not. All of these types of language express some kinds of coordination with an overt particle and it would be very difficult to account for this if the faithfulness constraint was ranked low. This is particularly so for those languages which alternate between overt and covert marking of coordination and those which mark certain types of coordination but not others. In such cases we would have very similar (or even identical) inputs being associated with different expressions. Without developing an account of the possibility of having different coordination particles for different conjunct types it is difficult to say whether or not it would be possible to have faithful expressions winning in one case and unfaithful expressions winning in others. But I assume that it will not be straightforward.

Another way to treat such cases would be to claim that the coordination feature is present in all coordinate expressions in these languages, but that it fails to be associated with an overt element when the syntactic structure gets "spelled out". In other words at the point when it is determined what the best phonological realisation of the abstract syntactic elements is, the null form is chosen. This might happen if the language has no exact phonological match for the constructed syntactic element and the use of another phonological word would be worse than not realising it at all.

Are there any languages which would fit the bill for one that does not syntactically represent the coordination particle? There might be. For example Dyirbal, as far as I can determine, does not overtly represent coordination particles. At least Johannessen claims it to be a language with "no audible coordinating conjunction" (1998 : 86), and every example that

[14] T'ung & Pollard actually categorise *kêshi* as a "moveable adverb" rather than a conjunction. However, they do categorise *dànshi,* also translated as 'but', as a conjunction.

I have found of coordinate expressions in this language has no overt coordination particle:

(33) bayi yara banin^{y}u bagul d^{y}ugumbbilgu balgalnan^{y}u
man-abs came-here woman-dat hit-antipassive
'the man came here and hit the woman'

Of course, it might be that this language spells out all of its coordination particles with a null phonological word. But where this might be a reasonable assumption for languages which have some overt evidence of having such an element, it is less convincing to assume the same for a language which never realises coordination particles overtly. Indeed the possibility of there being languages which have no syntactically represented coordination feature predicted by the system developed in this paper adds a degree of explanation which is not obtained if we are forced to assume that languages like Dyirbal have empty coordination particles, as Johannessen is: the reason why such languages have no overt phonological word to realise the coordination feature is because this feature never survives in the grammatical expressions of the language rather than it being mere accident that the language failed to give an overt form to its coordination particles.

4 Conclusion

In this paper I have attempted a cross linguistic analysis of the coordination particle, and while certainly not the last word on the issue the analysis presented is able to capture observed variation along three axes: whether all, one or no conjuncts are marked by the coordination particle; whether the particle precedes or follows its conjunct and whether marked conjuncts must precede or follow unmarked conjuncts. Crucial to this approach is the analysis of the particle as a representation of the coordination feature assigned to a predicate in the input rather than as a realisation of the coordination element itself. This seems the correct approach given that in many languages the coordination particle expresses more about the properties of the conjunct that it accompanies than it does about the conjunction itself. A number of questions have been raised however, that demand further research to answer. It is not clear whether the typology of languages assumed and to some extent motivated by the present paper is correct. In particular it is not clear whether there are languages which mark coordination on all conjuncts or those which do not mark coordination at all. If it turns out that these are not true language types, then clearly a very different analysis will be called for than the one presented here.

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