CLITIC POSITIONING IN OSSETIC

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Abstract

We present data regarding the positioning of clitics in the Iron dialect of Ossetic, which is in some respects similar to data for 'second-position' clitics in more familiar languages, but in other respects is considerably more complicated. We propose a formal analysis which makes use of Optimality Theoretic LFG with stochastic re-ranking of constraints, which is able to capture the full range of the data, while avoiding having to assume the controversial phenomenon of clitic 'movement'.

1 Introduction

The syntactic and prosodic properties of so-called 'second-position' clitics, and how these properties interact to determine their surface positioning, has been the subject of considerable work. Essentially, the question is to what extent the surface position of clitics in their clause can be accounted for by ordinary syntactic processes, and to what extent they must also be constrained and influenced by other factors, such as prosody. Accounts of clitic positioning in LFG include Newman (1996), Austin and Bresnan (1996), Nordlinger (1998a,b), O'Connor (2002a,b), Wescoat (2009), Bögel (2010, 2014, 2015), Bögel et al. (2010), and Lowe (2011, 2015a). In this paper we discuss the complex set of constraints on 'second-position' clitics in the Iron dialect of Ossetic.[1] Our position in this paper is that it is methodologically desirable to aim for a primarily syntactic account of a syntactic phenomenon — word order patterns — while acknowledging the influence of prosodic factors.[2]

The Iron Ossetic data regarding 'second-position' clitics have never been fully

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[1] Ossetic is an Iranian language spoken by approximately 700,000 people, the majority of whom live in the Republic of North Ossetia–Alania, Russian Federation. Ossetic consists of two closely-related dialects, Iron and Digor, both of which have standard varieties, but Iron is by far the dominant dialect, and the basis of the standard Ossetic language. This study is based on the standard variety of the Iron dialect. The transcription used for Ossetic examples follows Dzaxova (2009), with the following exceptions: /ə/ is used instead of Dzaxova's /ɔ/; single letters are used instead of digraphs for affricates (/c/ for /t^{s}/, /č/ for /t^{š}/, /ž/ for /d^{ž}/). Geminate consonants are written as two letters if they belong to two different morphemes (e.g. *kod-t-on* (do-TR-PST.1SG), phonologically /kot:on/), and with the length mark otherwise (*dɜtː-ən* (give-INF) 'to give'). Most examples of Ossetic sentences given in this paper are taken from the Ossetic National Corpus (http://corpus.ossetic-studies.org/en, c. 5 million wordforms); other examples are taken from published work, or from the fieldwork of the second author.

[2] In his analysis of Digor Ossetic clitics, Erschler (2010) shows that apparently prosodic positioning in that dialect is not, in fact, purely prosodic.

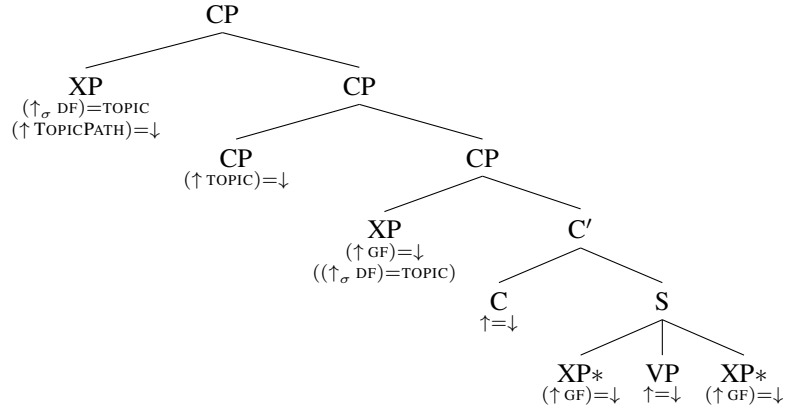
described, nor subject to formal analysis.[3] Much of the data regarding clitic positioning in Ossetic are very similar to data found in other languages, and can be analysed along similar lines. However, some data are, to our knowledge, unparalleled in the wider literature.

2 Ossetic clause structure

There is broad agreement on the hierarchical structure of the Ossetic clause.[4] For this paper, the finer details are not important; what matters is the generally agreed-upon right-branching hierarchical structure, with a number of positions in the left periphery associated with particular information structure roles. Ossetic word order is to a large extent 'discourse-configurational'. The unmarked order of constituents is SOV, but in principle all possible orderings of S, O and V can be grammatical. The constraints on the choice of orderings are essentially information structural: broadly speaking, topics appear near the left-edge of the clause, before the complementizer position, while foci appear to the right of the complementizer position, and to the left of the verb complex. While the order of major constituents is relatively free, there are some parts of the Ossetic clause which are relatively fixed. These include the verbal complex, in which a number of relatively grammaticalized particles must appear, along with the verb (Erschler 2012).

We assume a phrase-structure very similar to that assumed by Belyaev and Haug (2014), but differing in a few details. The structure we assume is shown in (1) and (2); these structures represent the range of possibilities, but all (terminal) nodes are optional, that is not all will be filled in any one clause.

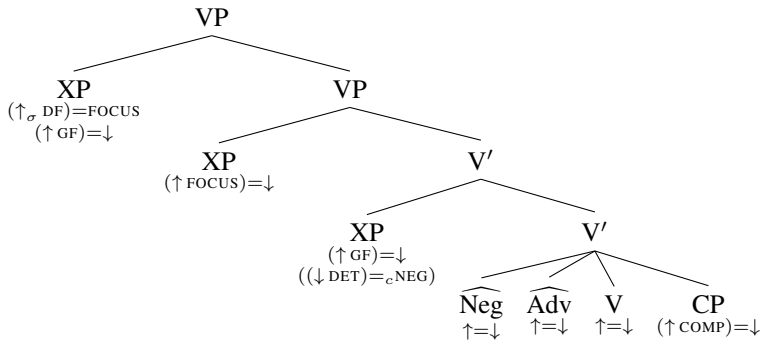
(1)



[3]Erschler (2010) provides a preliminary analysis of clitics in Digor Ossetic, but certain facts in that dialect are rather different from those in Iron.

[4]Compare Lyutikova and Tatevosov (2009) in the transformationalist tradition with e.g. Belyaev and Haug (2014) within LFG.

(2)



We treat the core of the Ossetic clause as a CP. Various elements may appear to the right or left of the core clause, however. Left-dislocated and right-dislocated topic phrases are adjoined to CP.[5] Relative clauses which form part of a correlative-relative construction are also adjoined to CP (the slot marked (↑ TOPIC) =↓).[6] The first element of the core clause is an optional XP appearing in Spec,CP. This phrase can fill any grammatical function in the main clause, but may not head a long-distance dependency. We assume here that XP may include DP/NP, AdjP, AdvP or PP, though the inventory of phrasal categories in Ossetic is debatable. One type of phrase may not appear in any of the XP slots in the trees: the VP is constrained to appear only in the VP slot (or, in the case of some non-finite verb phrases, embedded under a noun phrase). Following the first core position is a node, C, that can be filled by certain subordinating conjunctions (non-preverbal subordinating conjunctions: *kɜd* 'if', *səma* 'as if', *salənmɜ* 'while', *sɜmɜj* 'in order to', *jugɜr* 'if'). We then allow for the possibility of one or more phrases of any type to precede or follow the VP. Phrases that function as foci in information structure terms are adjoined to VP: there may in principle be any number of them, and they immediately precede the verbal complex, except that a few phrase types can intervene between IS foci and the verb complex. Of these, interrogative phrases, correlative phrases, and preverbal subordinators appear in Spec,VP, and negative phrases are adjoined to V′. The verbal complex consists of the V′, dominating the V, non-projecting negative particles and certain adverbs and adverbial particles which do not contribute PRED values, and embedded complement clauses.

3 Clitic positioning - the data

In Iron Ossetic all 'second-position' clitics in a clause must appear together in a single 'clitic cluster'.[7] There is a fixed order of elements within the clitic cluster,

[5]Right-dislocation is not shown in (1). On the annotations specifying information structure status, e.g. (↑σ DF) = TOPIC, see Dalrymple and Nikolaeva (2011). TOPICPATH resolves to (↑ COMP* GF), i.e. an argument or adjunct of the clause or any of its complements.

[6]We follow Belyaev and Haug (2014) in using f-structure TOPIC and FOCUS features to govern the correlative-relative structure, though the details are not important for this paper.

[7]Erschler (2010) shows that this is not the case in Digor, where clitics are in general freer in terms of their positioning.

but the details of this are unimportant for the present purposes. We treat this by means of the CCL node introduced by Bögel et al. (2010), which we treat as an exocentric category dominating any number of non-projecting CL nodes. Wherever below we refer to the positioning of a clitic, or clitics, we really refer to the positioning of a clitic cluster, which will include one or more clitics in any given clause.

(3) $\text{CCL} \rightarrow \underset{\uparrow=\downarrow}{\text{CL}^{+}}$

As a general rule, the 'second-position' occupied by 'second-position' clitics in the Ossetic clause can be unproblematically analysed in purely syntactic terms: clitics generally follow the first clause-level XP, regardless of its length.

(4) *=mɜm žawər =mɜm ɜrba-səd-i *=mɜm
me.ALL Zaur me.ALL PV-go-PST.INTR.3SG me.ALL
'Zaur came to me.'

(5) [žawər-ə *=dɜm rɜšuʁd *=dɜm čənz] =dɜm
Zaur-GEN thee.ALL beautiful thee.ALL bride thee.ALL
ba-zərd-t-a *=dɜm
PV-speak-TR-PST.3SG thee.ALL
'The beautiful bride of Zaur called for you.'

This is the first clause-level XP in the core CP. When a phrase is adjoined to the left of the core CP, clitics appear in *third* position:

(6) [ɜnuš-mɜ] [χɜrž-gɜn-ɜʒ-ə nom] =əl sɜmɜj š-bad-a
century-ALL good-do-PTCP-GEN name he.SUPER PURP PV-sit-SBJV.3SG
'So that he is forever called a good person.' (ONC)

(7) žon-əš, meret, [ɜž iron dɜrɜš-tɜ kɜj dar-ən],
know-PRS.2SG Meret I Ossetian clothing-PL COMP wear-PRS.1SG
[fəldɜr] =mɜ wəj təχχɜj nɜ waržə
more me.GEN that[GEN] for NEG love-PRS.3SG
'You know, Meret, he doesn't like me more because I'm wearing Ossetian clothes.' (ONC: *Max dug* 5, 1996)

In (6), the clitic follows the second full noun phrase; the first phrase is a left-dislocated constituent. In (7), the first phrase is a relative CP, while the initial XP of the main clause is the adverb *fəldɜr*, which is followed by the correlate *wəj*. The clitic follows the adverb, and thus it is technically in the third position; however, the correlative clause may be considered to be outside the core CP. Within the core CP, then, second syntactic position is the rule.

The situation is slightly more complicated if no XP appears to the left of the verbal complex.[8] If the main verb itself is the first word in the clause, the clitic cluster directly follows this:

[8]We omit here discussion of clitic positioning relative to complex predicates in Ossetic, and relative to clause-initial non-finite verb phrases.

(8) *nə-ffəšt-a* *=jɜ* *gardantə* *miχal*
PV-write-PST.3SG it.GEN G. M.
'It was Mikhal Gardanov who wrote it down.'

When the verb or the verbal complex falls into the scope of clitic cluster positioning, then, we see that for the most part the same principles apply that we have seen before: the clitic cluster appears in syntactic 'second position', which may be following the first full phrase or following the first word, where this is a lexical or functional head of the clause.[9] However, there is one context which cannot so easily be analysed, and which strongly suggests the influence of prosody on clitic positioning in Ossetic.

If the first elements in a clause are proclitics directly preceding the verb, the clitic cluster follows either the first proclitic, or the last proclitic immediately preceding the verb (9).[10]

(9) *sə* *(=šɜm)* *nɜ* *(=šɜm)* *wəd-i* **=šɜm,* *aχɜm* *nɜ-j*
what they.ALL NEG they.ALL be-PST.INTR.3SG they.ALL such NEG-is
'There is nothing that they did not have (lit. that to them there was not).' (spoken text)

In such examples, the first proclitic is always a proclitic question word. As such, this proclitic can be analysed as heading (and constituting) a full XP in the phrase-structure. Thus when the clitic appears following such a proclitic, we can analyse it in exactly the same way as all the examples we have seen above: the clitic follows the first full phrase of the core clause, which in this case merely happens to consist of a single proclitic word.[11] On the other hand, the possibility of the clitic appearing following more than one proclitic violates the generalizations we have made so far. As stated, in such a case the clitic appears directly before the verb, regardless of how many proclitics precede. In (9), the second proclitic is a negative particle which, following the phrase structure proposed in (2), is a sister to V. Under no analysis is it possible to treat the two proclitics preceding the verb as somehow forming a single constituent for the clitic cluster to follow.[12]

However we choose to analyse this alternation, it seems we must admit prosodic influence on the positioning of the clitic cluster, since the problematic position of

[9] In this, Ossetic clitics show similar distributional properties to clitics in some Slavic languages (e.g. Franks and King 2000).

[10] Ossetic proclitics are prosodically deficient insofar as they do not have lexical stress and require a host to their right on which to 'lean'. They are, however, positioned in the clause according to entirely 'ordinary' syntactic rules/processes, and as such their positioning can be accounted for entirely syntactically. We can therefore distinguish between elements that are *prosodically* clitic but not syntactically so (the 'simple clitics' of Zwicky 1977), and elements that are *syntactically* clitic (and also, though not necessarily, prosodically clitic), in Ossetic enclitics. In this paper we use the term *clitic* to refer exclusively to elements that are syntactically clitic, regardless of prosodic features. This means that our term *clitic* in relation to Ossetic refers only to elements that are enclitic.

[11] There is nothing typologically unusual about proclitics being able to host enclitics; this is also clearly attested in Ancient Greek, for example.

[12] Note also that it is not possible for anything to appear between proclitic particles and the V inside the verbal complex, apart from the clitic cluster in contexts such as that in (9).

the clitic cluster is possible only when the first elements in the clause are all proclitic.

Another phenomenon which provides further evidence for prosodic influence on clitic positioning is so-called 'clitic climbing'. Superficially, Ossetic displays two different kinds of clitic climbing, which we call 'strong clitic climbing' and 'weak clitic climbing'.

Strong clitic climbing (SCC) corresponds to clitic climbing in e.g. French, where clitics can appear in a higher clause, in c-structure terms, from the clause in which they must be understood. As in Romance languages, this can be taken as evidence for a complex predicate, i.e. for the monoclausal status at f-structure of a construction involving two separate verb forms.[13] In Ossetic, clitics that 'climb' to a higher clause are subject to exactly the same positioning constraints as clitics in simple clauses, and as such SCC does not contribute any new data to the analysis of clitic positioning itself; we therefore do not consider it further here.

Weak clitic climbing (WCC) is another matter. In general, WCC is a third option alongside SCC and in-situ positioning for clitics in certain embedded structures. In WCC, the clitic appears at the left-edge of the embedded clause. It 'climbs' insofar as it appears in a position that is not possible for a non-embedded clause, and insofar as it is prosodically cliticized onto the last word of the matrix clause, but in purely phrase structural terms there is no need to assume that the clitic has 'climbed' out of its clause.[14]

(10) *mɜn* *fɜnd-ə* *[(=jɜm)* *alə* *bon* *(=ɜm)* *kɜš-ən]*
me.GEN want-PRS.3SG it.ALL every day it.ALL look-INF
'I want to watch it every day.'

(11) *a-sə* *tɜkːɜ* *šaχat-əl* *=mɜ* *qɜw-ə* *[(=jɜ)*
this-ATTR exactly hour-SUPER me.GEN need-PRS.3SG it.GEN
ba-žon-ən *(=ɜj)]*
PV-know-INF it.GEN
'It is exactly now that I need to know it.' (ONC: *Max dug* 9, 2007)

What is relevant here is that WCC shows us clitics appearing in a position within an embedded clause that they could not occupy in a non-embedded clause. Contrast the variable positioning of the clitic in the embedded clause in (11) with the obligatory positioning in the almost identical finite clause in (12), and the position of the clitic in (10) with that in (13).

(12) **=ɜj* *žon-ən* *=ɜj*
it.GEN know-PRS.1SG it.GEN
'I know it.'

[13] See for example Zaenen and Dalrymple (1996), Alsina (1997), and Butt (1997), within LFG, and Abeillé et al. (1998) within HPSG. The Romance data is discussed in detail by Monachesi (2005).

[14] Note that clitics are not hosted by C in this position, since there is no overt C in these embedded clauses. The clitic in (10) may also undergo SCC (to appear after *mɜn*).

(13) *=ɜm alə bon =ɜm kɜš-ən
it.ALL every day it.ALL look-PRS.3SG
'I watch it every day.'

Whatever formal analysis we adopt, in purely descriptive terms it remains the case that clitics cannot appear clause-initially in non-embedded clauses, but can in certain embedded clauses, in which case they are prosodically enclitic on the final word of the matrix clause. This suggests again that there are prosodic factors at work, ruling out absolute initial position for the clitic cluster in non-embedded clauses where there is no prosodic host to the left, but licensing absolute initial position in some embedded clauses.

The final constraint on clitic positioning in Ossetic is undoubtedly the most interesting, from both formal and typological perspectives. When a clause begins with a conjunction, any clitics in that clause are constrained to appear directly following the conjunction. Compare (14) with (5).

(14) ... ɜmɜ =dɜm [žawər-ə rɜšuʁd čənz] *=dɜm
and thee.ALL Zaur-GEN beautiful bride thee.ALL
ba-zərd-t-a
PV-speak-TR-PST.3SG
'... and the beautiful bride of Zaur called for you.'

Under either a parallel approach to conjunction, or a ConjP approach, this cannot be treated as second syntactic position within the CP, since the Conj does not appear in the CP. If the conjunction precedes a clause which contains a left-dislocated phrase or relative-correlative structure, the clitic cluster must appear *before* such phrases, that is outside the core CP.

It is therefore impossible to explain the position of the clitic cluster in examples such as (14) according to the same principles we have made use of in previous sections. At least in descriptive terms, it appears to be the case that the clitic cluster is 'attracted' out of its usual domain (the core CP) by a preceding conjunction. There are certain parallels between this possibility and what we have already seen: just as with weak clitic climbing, discussed in the previous section, the clitic cluster is able to appear at (or even to the left of) the left edge of its clause, as long as there is a prosodic host.

It is not only in the case of clausal conjunction that clitics are apparently 'attracted' to a preceding conjunction. When the first full phrase in a clause contains a conjunction, the clitic cluster may optionally appear directly following the embedded conjunction, even though this means that they appear inside a nominal constituent of which they are not themselves a part.

(15) [žawər ɜmɜ (=mɜm) alan] (=mɜm) ɜrba-səd-əštə
Zaur and me.ALL Alan me.ALL PV-go-PST.INTR.3PL
'Zaur and Alan came to me.'

There is no obvious prosodic or functional motivation for this (on the prosody, see below). The clitics concerned are not a part of the phrase in which they appear,

and there is simply no motivation for any position inside a nominal coordinate structure which could host clitics that do not even relate to that coordinate structure. Importantly, it does not matter how deeply embedded the conjunction is inside the first full phrase of the clause. In (16), the clitic appears following a conjunction embedded inside an adjectival phrase which is itself embedded inside the first full phrase of the clause.[15]

(16) *bɜχ, kʷətːɜr =əl a-bad-tɜn, aftɜ =jɜ*
horse as.soon.as it.SUPER PV-sit-PST.1SG thus it.GEN
ba-mbɜršt-a, [[ɜdəχ ɜmɜ =jəl ɜnɜ-bon]$_{AdjP}$ lɜg]$_{NP}$ kɜj
PV-understand-PST.3SG weak and it.SUPER without-skill man that
bad-ə, wəj
sit-PRS.3SG that.GEN
'As soon as I mounted the horse, it immediately understood that a weak and unskillful man was riding it.' (ONC)

The relevant CP in this example runs from *ɜdəχ* to *bad-ə*; the first full phrase is the noun phrase *ɜdəχ ɜmɜ ɜnɜ-bon lɜg*, of which all but the final word is an embedded adjectival modifier. The clitic is placed not following the whole noun phrase, as we would expect, nor even following the adjective phrase, but inside the adjective phrase, directly following the conjunction. There is no way to explain the positioning of the clitic cluster in such examples by assuming that coordinated phrases can be split by processes such as topicalization. In Ossetic coordinated noun (or adjective) phrases cannot be split by any such processes.

This is the only context in which the clitic cluster may appear within a noun phrase; this context aside, there is a clear constraint against clitics appearing inside a noun phrase. For example, SCC is obligatory from case-marked infinitive phrases, which is most appropriately explained by assuming that case-marked infinitives do not head CPs or VPs, but noun phrases.

In this section we have seen roughly four distinct possibilities for clitic positioning in Ossetic, at least in purely descriptive terms. As a default, clitics appear in second syntactic position, i.e. following the first full phrase in their clause, or else following the first word, where this is a lexical or functional head (V or C). Clitics may also appear directly before the verb, when the only elements that precede the verb in the clause are proclitics. Alternatively, they may appear at the left edge of their clause in certain embedded clause types (weak clitic climbing). Finally, if a conjunction appears at (directly before) the left edge of a clause, then the clitics must directly follow the conjunction, and if there is no clausal conjunction but the first full phrase of the clause containts a conjunction, however deeply embedded, the clitics may appear directly after this conjunction. In the following section, we compare different strategies for dealing with this variety of positioning possibilities.

[15]It should be possible for the clitic to alternatively appear following the whole NP, as in (15), though only this form of the sentence exists in the corpus.

Let us summarize again the descriptive possibilities for clitic positioning, now with specific reference to the phrase-structure of Ossetic given above (1, 2).

(17)
a. Following first XP of core CP.
b. Following V, if V is first in CP.
c. Optionally, at left edge of embedded CP (WCC).
d. Optionally, between proclitics and V, if only proclitics precede the V.
e. At left edge of (outermost) CP, if clausal conjunction precedes the CP.
f. Optionally, directly following a phrasal conjunction that appears inside the first XP of the core CP.

4 Analysis

There are in principle a number of approaches that could be taken to the positioning of clitics in the Ossetic clause.

A number of recent treatments of clitics in LFG, e.g. by Bögel et al. (2010), Lowe (2011, 2014, 2015b) and Bögel (2015) involve languages with relatively free word order, and these analyses make use of the exocentric category S to model phrase-structure in their respective languages. This means that these analyses avoid the complications of hierarchical structure, and it is relatively simple, for example, to state that the clitic cluster appears in second syntactic position.

This may appear to be a promising approach to the clitic data. However, besides a default rule placing the CCL in second syntactic position, we would still need additional rules to license the appearance of clitics following an initial V or C, directly before V when two proclitics precede, at the left edge of an embedded S, at the left edge of an S preceded by a clausal conjunction, and the most problematic context: appearing inside the initial XP when this contains a phrasal conjunction. A lack of hierarchical structure would not necessarily make it any easier to account for any of these possibilities, and it certainly does not make it possible to reduce or collapse any of these possibilities by means of a more general statement. At the same time, we would have to abandon the generally agreed-upon hierarchical structure of the Ossetic clause, which is widely assumed on other grounds. Altogether, it does not seem that a flat analysis really gains us anything in accounting for clitic positioning, and it certainly loses something in the analysis of Ossetic c-structure more generally.

A further possibility, which at first sight appears promising but which ultimately does not live up to its promise, is the possibility of accounting for clitic positioning not by reference to syntax, but purely by reference to prosody. Purely prosodic approaches to clitic positioning in different languages are taken by authors such as Radanović-Kocić (1988, 1996), Anderson (1993, 1996, 2000, 2005), O'Connor (2002b) and Keydana (2011). However, all such accounts necessarily involve some interaction with syntax; even at the most basic level, the prosodic units with respect to which clitics are positioned *always* coincide with syntactic

units (e.g. positioning with reference to prosodic words, which always coincide with at least one full syntactic word). Significantly, there are no examples known to us that involve clitic positioning by reference to prosodic structures that specifically do not coincide with syntactic structure; for example, there are no examples of clitics that are invariably placed following the first syllable of a clause, regardless of whether that syllable coincides with a full word, or even a full morpheme. Since syntax must be involved, we believe that a fundamentally syntactic account should be the null hypothesis in any analysis of clitic positioning.

Nevertheless, prosodic positioning of some sort may seem a reasonable explanation for the Ossetic data. At the very least, based on the behaviour of WCC and preverbal proclitics, it is clear enough that prosody has some role to play in constraining clitic placement in Ossetic. But prosody by itself fails to provide an adequate account. As we have seen, the default position for clitics is following the first full XP of the clause. While initial XPs do generally carry a single strong stress in Ossetic, this is only the case for short and medium length XPs, i.e. those consisting of only a few words (which constitute the vast majority of examples). Very long XPs are also possible, e.g. noun phrases with embedded relative clauses, and it is not reasonable to assume that these carry a single stress or function as single prosodic units of equivalent status to those of short XPs. The generalization is therefore syntactic, not prosodic, even if many of the syntactic contexts share a similar prosody.

In addition, it is also not possible to explain purely by reference to prosody the positioning of clitics after a conjunction embedded inside the initial XP of a clause, and indeed in purely prosodic terms the similarity between this positioning and the obligatory positioning after a clausal conjunction is lost. Clausal conjunctions are characterized by stress, whereas phrasal conjunctions which can host clitics are stressless (and prosodically encliticized onto the preceding word). Thus the fact that conjunctions can host clitics, both when clausal and phrasal, cannot be explained by reference to prosody, but depends on their syntactic category.

We therefore see only one viable way of analysing clitic positioning in Ossetic, namely by reference to the hierarchical syntactic structure, but making use of additional strategies and constraints where these are required (and only where they are absolutely required). There is no one place in the hierarchical structure where the clitic cluster obviously adjoins in all examples; rather, it appears that the clitic cluster is almost unrestricted in terms of where it may adjoin (with the proviso that it is largely restricted to adjunction to clause-level categories). We therefore assume that the simplest approach is to permit the clitic cluster to (left-)adjoin almost anywhere in the c-structure, and then utilize other constraints to determine the correct adjunction site in any instance. The alternative would be to restrict the possible adjunction sites, even down to one site (e.g. adjunction to C, or absolute first position in CP), but then we would encounter more serious difficulties in accounting for the situations where the clitic cluster surfaces somewhere else (e.g. after the verb); to deal with this we might require recourse to concepts such as ‘movement’, however understood, in order to account for the surface position. We believe that

an approach which can do without 'movement' (whether prosodic or syntactic) is in principle to be preferred (though that is not to say that for some phenomena, in some languages, that may not be the best, or only, solution).

We therefore adopt an approach in which as many phrase-structure positions as possible are licensed for the clitic cluster, in order to permit as many of the attested surface positions as possible to be accounted for purely by reference to the phrasal syntax. One of the difficulties with any hierarchical account is how to deal with the fact that the clitic cluster can appear following in principle any XP position that precedes the verb, as long as it is the first filled XP position in the CP. That is, considering again the trees in (1) and (2), there are a variety of XP positions within the core CP, all of which are optional, and all of which could therefore potentially serve as the first XP in the clause. The phrase in Spec,CP is a default topic, while elements in Spec,VP and adjoined to VP function as foci. But whether the first XP in a clause is topical or focal, the clitic cluster will directly follow it. One way to deal with this is to permit the clitic cluster node, the CCL, to adjoin to the left of any clausal head or projection, via the following rules:

(18)

a.	CP	→	CCL	CP	d.	V′	→	CCL	V′
			↑=↓	↑=↓				↑=↓	↑=↓
b.	C′	→	CCL	C′	e.	S	→	CCL	S
			↑=↓	↑=↓				↑=↓	↑=↓
c.	VP	→	CCL	VP	f.	V	→	CCL,	V
			↑=↓	↑=↓				↑=↓	↑=↓

The rules in (18a–e) license adjunction of CCL to the left of CP, C′, VP, V′ and S. The rule in (18f) licenses adjunction of CCL to the left or right of V; this variability in positioning is required to account for orderings like that in (8), where the CCL directly follows the verb. Together, these rules essentially amount to the statement that clitics may appear anywhere in the clause, up to the immediately post-verbal position. Clearly, therefore, the application of these rules must be constrained in such a way that the CCL only ever actually appears following the initial XP, or the verb if it is clause-initial. To this end, we must assume a general constraint (formalized below) to force the clitic cluster to appear as far leftwards in the clause as possible. For example, if we have both a topical XP in Spec,CP and a focal XP in Spec,VP, in principle the clitic cluster could be adjoined to either C′ or V′, but in fact it must appear following the leftmost, topical, XP. WCC and the attraction of clitics to clause-preceding coordinating conjunctions can be handled in a similar way as adjunction to the uppermost CP.

This rule can also account for the appearance of clitics between the proclitic verbal particles and the V, inside the verbal complex. However, in conjunction with the rule requiring clitics to appear leftmost in their clause, it is then problematic to account for the appearance of the clitic cluster directly before the verb when more than one proclitic precedes and when the first of those proclitics can be analysed as the head of a separate, full, XP. This is accounted for below.

In addition to the rules in (18), we also require a rule licensing the appearance

of a CCL as a daughter of the exocentric category S. It is possible that the first and second XPs in a clause are both XP daughters of S, and if this is so the CCL must appear following the first XP, meaning that it too must be a daughter of S. In order to capture the fact that, within S, the CCL must appear following the first XP, whatever that is, we must assume the following rule expanding S:[16]

(19) S → (XP CCL) XP* VP (CCL) XP*
(↑ GF) =↓ ↑=↓ (↑ GF) =↓ ↑=↓ ↑=↓ (↑ GF) =↓

Finally, we must account for the positioning of clitics after an embedded phrasal conjunction. Since we cannot say how embedded the Conj is, it is difficult, but not impossible, to state a functional constraint on the CCL that will permit it to 'reach out' of the phrase within which it is embedded and make its contribution at the clausal level, and that would not also permit it to make a contribution at a higher level, if it were part of an embedded clause.

(20) Conj → Conj CCL
↑=↓ ((∈)GF* ↑) =↓
¬(→ TENSE)

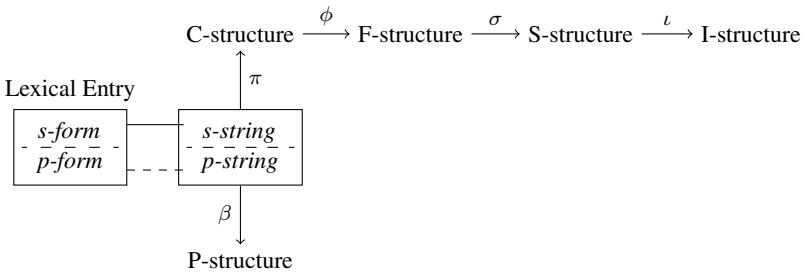
As mentioned, in addition to the ordinary phrase-structure rules licensing adjunction of the CCL, we must also assume a number of more general constraints which serve to restrict the adjunction possibilities, such that there are at most two, and usually only one, possible positions for the CCL in any instance. We propose to model this using OT constraints, with stochastic re-ranking to account for cases where two positions are possible. In this, we build on the OT-LFG analysis of clitic positioning proposed by Lowe (2015a), although the constraints we require are somewhat different.

In Optimality Theoretic approaches to LFG, any full or partial structure (usually an f-structure) serves as the INPUT, a 'universal' LFG grammar is the GEN, and the set of candidates produced by applying the INPUT to GEN are evaluated according to a set of ranked constraints EVAL (on Optimality Theoretic LFG see, for example, Bresnan 1996, 2000a,b; Frank et al. 1998; Kuhn 1999, 2001). While early Optimality Theoretic approaches to LFG focused primarily on the core projections, f-structure and c-structure, Lowe (2015a) proposes a more complex system, based on a more complex projection architecture. The constraints against which candidates are evaluated may refer to any structure in the projection architecture, or to any projection function between structures. For Bresnan (2000a: 15), each candidate was a quadruple consisting of a c-structure, an f-structure, the mapping from the lexicon to c-structure and the mapping from c-structure to f-structure. For Lowe (2015a), the candidates are fifteen-fold, based on the architecture shown in (21) (Dalrymple and Mycock 2011, Mycock and Lowe 2013):[17]

[16] Another option would be to abandon S, replacing it by an endocentric category, perhaps I, meaning that rules parallel to those in (18) could be stated. But there is no evidence that any element heads I in Ossetic.

[17] The fifteen aspects are: s–string, p–string, p–structure, c–structure, f–structure, s–structure, i–

(21)



A frequent criticism of OT is that an infinite set of candidates makes the grammar too unconstrained and computationally intractable. This is a basic theoretical principle of OT and is thus carried over to those variants of OT-LFG which strive to override existing LFG mechanisms. For example, Bresnan (2000a) envisages OT-LFG as a general model of grammar that completely replaces the traditional c-structure rules and f-structure equations. Such an approach does require an infinite set of candidates to function properly, as there is no other way of accounting for grammaticality and cross-linguistic variation except for inherently violable OT constraints.

However, most actual applications of OT to LFG, e.g. Butt et al. (1997), Broadwell (1999), are not as radical. They only analyze competition between those structures which are difficult to disambiguate using the standard, inviolable, grammatical constraints. The role of OT is thus merely that of an additional filtering mechanism that models competition between several possible realizations of a single underlying structure. In such applications of OT, it is commonly assumed that the candidate set is generated by a normal LFG grammar. This makes it finite by definition, therefore rendering the aforementioned criticism invalid. Since all candidates involved in the computation are generated by a normal LFG grammar, such an approach is not any more unconstrained than standard LFG.

At the same time, it cannot be disputed that some sort of OT-like filtering mechanism must be present in any grammatical theory for resolving syntactic ambiguity, whose range in natural language is far greater than any traditional rule-based formalism can handle. This is the motivation behind the use of OT-like constraints in XLE (Frank et al. 1998).[18] If an OT-like mechanism is required for disambiguation in any case, extending its use for other purposes ought not to significantly increase computational complexity.

For our purposes, the relevant constraints refer either to the s(yntactic)-string or the p(rosodic)-string, or to the mapping between the string and c-structure (π). We assume the following constraints:[19]

structure, β, π, ϕ, σ, ι, two 'lexicalization functions', which map from the s–string and p–string to the (language-specific) lexicon, and the interface between s–string and p–string.

[18]The only difference is that XLE OT-like constraints only evaluate potential analyses of a given sentence but do not examine other potential candidates with the same f-structure. Therefore, any sentence that is allowed by the LFG grammar will be considered grammatical, even if it is ruled out by competition with other candidates.

[19]Some of these are taken from Lowe (2015a), partially building on proposals for OT constraints

(22)
a. ALIGN(CL,L;PW,R): align the left edge of a prosodic clitic with the right edge of a prosodic word. (A prosodic constraint preventing enclitics from appearing at left edge of prosodic unit.)

b. *MOVE–RT: Do not move a clitic rightwards in the π mapping. (Constraint penalizing 'movement' of clitics.)

c. *MOVE–LFT: Do not move a clitic leftwards in the π mapping. (Constraint penalizing 'movement' of clitics (prosodic inversion).)

d. *CL-IN-NP: No word that appears at the left edge of an NP may appear to the left of a clitic, unless the word that appears at the right edge of that NP also appears to the left edge of the clitic. (Constraint against clitics appearing inside NP.)

e. *ALIGN(CL,L;DOM,L): Do not align the left edge of a clitic with the left edge of its syntactic domain. (Syntactic constraint against clitics at left edge of CP.)

f. ALIGN(CL,L;DOM,L): align the left edge of a clitic with the left edge of its clause. (Syntactic constraint constraining clitic to appear as far leftward in the clause as possible.)[20]

g. *CL-BTW-PROCL: Penalize every enclitic that appears between two proclitics. (Prosodic constraint against (en)clitics appearing between two proclitics, i.e. prefer [Pro Pro$^+$ Enc] over [Pro$^+$ Enc Pro$^+$].)[21]

We assume the following ranking, with stochastic range as indicated. The competition between constraints f and g licenses the optional positioning listed in (17d) above; competition between f and e licenses the optionality listed in (17c); competition between f and d licenses the optionality in (17f). Constraints a, b and c need never be violated in accounting for Ossetic clitics, but they are included since they rule out theoretically possible structures, such as clitics first in a standalone clause, or analyses involving 'movement'.[22]

(23) Constraint ranking, showing stochastic range:
$[_a$ a $]_a$ > $[_b[_c$ b,c $]_b]_c$ > $[_d[_e$ d,e > $[_f$ f $]_d]_e$ $[_g$ $]_f$ g $]_g$

5 Examples

When clitics appear in second syntactic position, whether this is following the first clause-level XP, as in (4), (5), (6), and (7), or following an initial V or C, as in (8), or at the start of a clause following a clausal conjunction (14), the PS-rules proposed above, in combination with constraint f, requiring clitics to appear as far

on clitics by Legendre (e.g. 2000), Grimshaw (2001), and Woolford (2002).

[20]Following McCarthy and Prince (1993), alignment constraints can be multiply violated, so the further left a clitic appears, the fewer violations it incurs.

[21]This constraint may appear somewhat ad hoc, but seems intuitively plausible, and fits with patterns of proclitic-enclitic alignment in related languages such as Ancient Greek and Vedic Sanskrit (Lowe 2014).

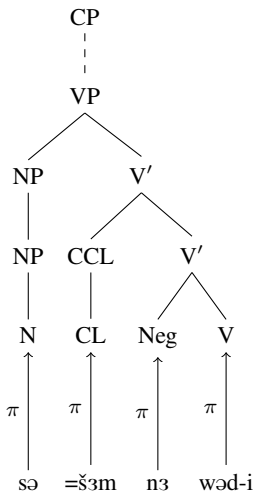
[22]Constraints b and c are treated as separate constraints following Lowe (2015a); Lowe (2015a) ranks b above c, but this is not relevant to the present analysis.

left as possible, will unproblematically account for the position of the clitic cluster. We omit exemplifying this here.

The variable positioning of clitics when the clause begins with more than one proclitic immediately preceding the verb, as seen in (9), is captured by the variability in ranking of constraints f and g. This is illustrated in (25) and (26), which provide analyses for (9=24).[23]

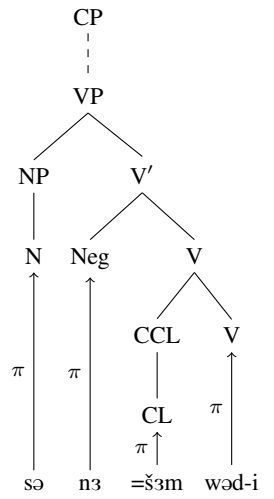
(24) *sə* *(=šɜm)* *nɜ* *(=šɜm)* *wəd-i* **=šɜm,* *aχɜm* *nɜ-j*
what they.ALL NEG they.ALL be-PST.INTR.3SG they.ALL such NEG-is
'There is nothing that they did not have (lit. that to them there was not).' (spoken text)

(25)



Input = f-structure		a	b	f	g
a.	*c–str. =š. s. n. w.* *s–str. =š. s. n. w.* *p–str. =š. s. n. w.*	*!			
☞ b.	*c–str. s. =š. n. w.* *s–str. s. =š. n. w.* *p–str. s. =š. n. w.*			*	*
c.	*c–str. s. n. =š. w.* *s–str. s. n. =š. w.* *p–str. s. n. =š. w.*			**!	
d.	*c–str. s. n. =š. w.* *s–str. s. =š. n. w.* *p–str. s. =š. n. w.*		*!	*	

(26)



Input = f-structure		a	b	g	f
a.	*c–str. =š. s. n. w.* *s–str. =š. s. n. w.* *p–str. =š. s. n. w.*	*!			
b.	*c–str. s. =š. n. w.* *s–str. s. =š. n. w.* *p–str. s. =š. n. w.*			*!	*
☞ c.	*c–str. s. n. =š. w.* *s–str. s. n. =š. w.* *p–str. s. n. =š. w.*				**
d.	*c–str. s. n. =š. w.* *s–str. s. =š. n. w.* *p–str. s. =š. n. w.*		*!		*

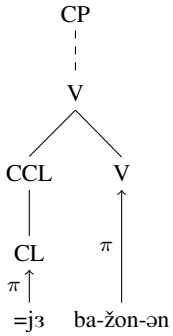
The optionality of 'Weak Clitic Climbing' is captured by the re-ranking of constraints e and f. This is exemplified in (28) and (29), for the sentence in (11=27). For the optional alignment of the clitic cluster following a phrasal conjunction embedded inside the first XP of a clause, the two possibilities are obtained by the

[23]Here we illustrate merely the potential effects of varying the stochastic weights of the constraints; a greater volume of naturally occurring data would be required to make claims as to the actual weights.

variable ranking of constraints d and f. This is exemplified in (31) and (32), on the following page, for the sentence in (15=30).

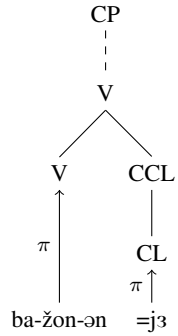
(27) *a-sə* *tɜkːɜ* *šaχat-əl* *=mɜ* *qɜw-ə* *[(=jɜ)*
this-ATTR exactly hour-SUPER me.GEN need-PRS.3SG it.GEN
ba-žon-ən *(=ɜj)]*
PV-know-INF it.GEN
'It is exactly now that I need to know it.' (ONC: *Max dug* 9, 2007)

(28)



Input = f-structure		a	b	c	f	e
☞ a.	*c–str. =jɜ b.* *s–str. =jɜ b.* *p–str. =jɜ b.*					*
b.	*c–str. b. =ɜj* *s–str. b. =ɜj* *p–str. b. =ɜj*				*!	
c.	*c–str. b. =ɜj* *s–str. =jɜ b.* *p–str. =jɜ b.*		*!			*
d.	*c–str. =jɜ b.* *s–str. b. =ɜj* *p–str. b. =ɜj*			*!	*	

(29)



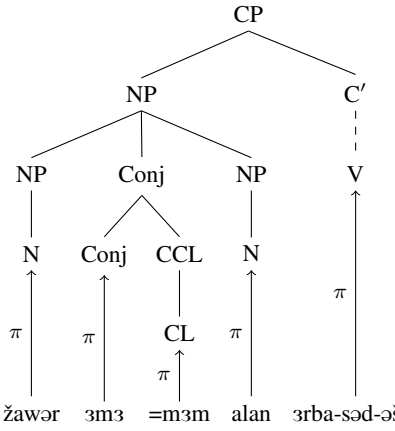
Input = f-structure		a	b	c	e	f
a.	*c–str. =jɜ b.* *s–str. =jɜ b.* *p–str. =jɜ b.*				*!	
☞ b.	*c–str. b. =ɜj* *s–str. b. =ɜj* *p–str. b. =ɜj*					*
c.	*c–str. b. =ɜj* *s–str. =jɜ b.* *p–str. =jɜ b.*		*!		*	
d.	*c–str. =jɜ b.* *s–str. b. =ɜj* *p–str. b. =ɜj*			*!		*

6 Conclusion

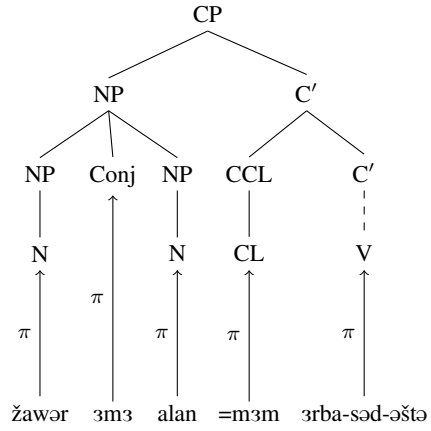
The data on clitic positioning in Ossetic is complex, suggesting that a number of interacting factors are at work in constraining clitic position. Some of these factors are clearly syntatic, others appear to be prosodic. We have shown that this can be modelled in LFG using a stochastic version of OT which permits constraints from different components of the grammar, e.g. syntax and prosody, to jointly contribute to the evaluation of the optimal candidate. Our analysis does not require clitic 'movement', and permits us to capture the variable positioning of the Ossetic clitic cluster without compromising the widely-agreed hierarchical structure of the Ossetic clause. Our analysis involves almost unrestricted adjunction possibilities for the Ossetic clitic cluster, constrained by OT constraints, and this enables us to capture the linear aspect of clitic positioning without abandoning the hierarchical c-structure.

(30) *[žawər ɜmɜ (=mɜm) alan] (=mɜm) ɜrba-səd-əštə*
Zaur and me.ALL Alan me.ALL PV-go-PST.INTR.3PL
'Zaur and Alan came to me.'

(31)



(32)



Input = f-structure		c	f	d
a.	*c–str. ž. ɜm. a. =m. ɜr.* *s–str. ž. ɜm. a. =m. ɜr.* *p–str. ž. ɜm. a. =m. ɜr.*		**!*	
☞ b.	*c–str. ž. ɜm. =m. a. ɜr.* *s–str. ž. ɜm. =m. a. ɜr.* *p–str. ž. ɜm. =m. a. ɜr.*		**	*
c.	*c–str. =m. ž. ɜm. a. ɜr.* *s–str. ž. =m. ɜm. a. ɜr.* *p–str. ž. =m. ɜm. a. ɜr.*	*!	*	*

Input = f-structure		c	d	f
☞ a.	*c–str. ž. ɜm. a. =m. ɜr.* *s–str. ž. ɜm. a. =m. ɜr.* *p–str. ž. ɜm. a. =m. ɜr.*			***
b.	*c–str. ž. ɜm. =m. a. ɜr.* *s–str. ž. ɜm. =m. a. ɜr.* *p–str. ž. ɜm. =m. a. ɜr.*		*!	**
c.	*c–str. =m. ž. ɜm. a. ɜr.* *s–str. ž. =m. ɜm. a. ɜr.* *p–str. ž. =m. ɜm. a. ɜr.*	*!	*	*

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