A Treatment of Clitics via Prosodic Phonology in LFG

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One school of thought within linguistics holds that so-called *phrasal affixes* (Anderson 2005), or clitics, must be dealt with within the morphological module because they pattern like inflectional affixes, but at the phrasal level (Zwicky 1987, Samvelian 2007, Miller 1992). Most proponents of this idea as to the architecture of grammar have worked within HPSG (Head-Driven Phrase Structure Grammar); the notion is also compatible with GB/Minimalism in that clitics can be seen as functional items which are placed high in the tree (e.g. within IP), and can thus be thought of as essentially inflectional items, but which are postlexical (e.g. van der Leeuw 1997). The idea of analyzing a subset of clitics as needing to be treated in the morphology has been carried into LFG (e.g. Sadler and Spencer 2000, Luís and Otoguro 2005).

In this paper, we propose a different architectural model and argue that it is more consonant with the overall architecture of LFG. Like Butt and King (1998) for Bengali clitics and Bögel et al. (2008) for Urdu *ezafe*, we argue that the recognition of prosodic phonology in the treatment of clitics is essential (see also O'Connor 2005a) (this dimension of analysis is absent in Zwicky 1987, Samvelian 2007, Miller 1992, Sadler and Spencer 2000, Luís and Otoguro 2005). With respect to this point, we focus on the analysis of Dutch pronominal clitics (Berendsen 1986, Gussenhoven 1986, Gussenhoven 1989, Lahiri et al. 1990, Wheeldon and Lahiri 1997, 2002) and suggest that the tension between the phonological/prosodic and syntactic properties of clitics can be elegantly modeled by introducing a treatment of prosody that interacts with the syntax, but that is also decoupled from it.

Most previous treatments of the prosody-syntax interface, including that of Butt and King (1998) and Bögel et al. (2008), have posited a prosodic projection that is in a sense derivative of the syntactic tree (c-structure in LFG) in that the syntactic tree comes first and the prosodic structure is determined on the basis of this tree (e.g. Culicover and Rochemont 1983, Cinque 1993, Nespor and Vogel 1986). As is well-known, however, prosodic and syntactic structure do not stand in a one-to-one relationship to one another. The example in (1), taken from Wheeldon and Lahiri (1997) and assuming basic syntax, illustrates this.

(1) a. $[[[\text{The man}]_{NP} [\text{I}]_{NP} [[\text{talked to}]_V [\text{in the school}]_{PP}]_{VP}]_{NP} [\text{is ill}]_{VP}]_S$

  b. $[[[[\text{The man}]_{\omega} [\text{I talked to}]_{\omega}]_{\sigma} [[\text{in the school}]_{\omega}]_{\sigma}]_{IP} [[[\text{is ill}]_{\omega}]_{\sigma}]_{IP}]\ _U$

The non-alignment between prosodic and syntactic structure takes several different forms (see Butt and King 1998 for a short overview), and attempts to resolve it usually take the form of more or less complex algorithms which map between syntax and prosody. In this paper, we explore another possible architecture, one that is similar to that originally proposed by Selkirk (1986), who puts forth the requirement that a unit of phonological structure have as its terminal string the stretch of the surface syntactic structure that is demarcated by the right or left ends of selected syntactic constituents. From our survey of the literature, prosodic phrasing seems to largely follow syntactic chunks and can thus indeed be determined by paying attention to the Part-of-Speech (POS) information in a given string. Prosodic phrasing which is non-aligned with syntactic constituents, such as that in (1) or in the Dutch pronominals shown in (2), can then be dealt with via an independent prosodic parser which pays attention to prosodic tonal information and POS (this assumes the input is annotated with tonal information). In particular, clitics, which are easily identifiable by their POS as they are closed-class items, will need to be incorporated into the prosodic word to their right or their left (b), rather than forming their own individual unit (a).

(2) a. [[ik] [zoek   [der   krant]]]   b. [[ik]   [zoekter]   [krant]]
        I   look for her   newspaper   I   look for.her   newspaper
        'I look for her newspaper.'   'I look for her newspaper.' Lahiri et al. (1990:118)

In order to be as concrete as possible, we model our approach by using XLE (Crouch et al. 2009) and propose to extend its capabilities in the following way. XLE accepts as input a string which also contains tonal information. This tonal information is parsed by a new component within XLE, namely a finite-state transducer that introduces prosodic brackets that are consistent with the High and Low tones. This finite-state prosodic parser also necessarily pays attention to POS, which can be looked up in the morphological lexicon, just as with the c-structure parser. The output of the prosodic parser is a prosodically bracketed string (along the lines of O'Connor 2005b). The syntactic XLE parser then parses the input and uses the prosodic brackets to guide its syntactic parsing. This captures the fact that syntactic chunks preferably line up with prosodic chunks. In order to model this preference, we use the Optimality Theoretic component embedded within XLE (Frank et al. 1998) to prefer the parse(s) that violate the fewest prosodic brackets.

The prosodic parser does not need to have more than finite-state capability because the necessary prosodic rules lack center-embedding type recursion and have a bounded number of levels (e.g. prosodic words, prosodic phrases, intonational phrases), thus representing regular relations. This is an important point: much of the prosodic literature is characterized by claims about the recursive nature of prosodic rules, but there seems to have been little investigation into this question from a formal computational perspective. There are two additional features of our approach. First, our approach can easily deal with second position phenomena, where the clitic follows the first prosodic word in the utterance. Second, it also allows for examples of determiner and adverb cliticization as in (3), which would not be analyzed as being parallel to inflectional morphology. Instead, these are analyzed only at the phrasal level because determiners and adverbs do not form part of the verbal inflectional paradigm.

(3) a. Ik $[[[zoek]_\omega \quad het]_\omega]_\sigma$ water b. Ik $[[[trap]_\omega \quad te]_\omega]_\sigma$ hard
       I   look for   the   water   I   kick   too   hard
       'I look for the water.'   'I kick too hard.' Lahiri and Wheeldon (1997:358)

Beyond being able to treat all types of clitics with essentially the same mechanism, thus capturing their essentially prosodic nature, we do justice to exactly this prosodic dimension. It is not clear why this prosodic dimension is ignored in work such as Zwicky (1987) or Luís and Otoguro (2005), and we have focused on the Dutch clitics precisely because a series of psycholinguistic experiments have demonstrated that it is the prosodic factors that are relevant in understanding these clitics, rather than morphosyntactic ones (Lahiri et al. 1990, Wheeldon and Lahiri 1997, 2002).

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