Displaced Dependent Constructions

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The narrow goal of this paper is to develop an LFG analysis of what Kay and Sag (2012) call Displaced Dependency constructions (DDCs) seen with some adjectives (*difficult*, *impossible*, *fun*) and degree words (*so*, *too*, *as*, *more*, and synthetic comparatives) exemplified in (1)-(3). The broader goals include comparison with the technical apparatus of HPSG and SBCG (where plausible analyses have been proposed), and the role of constructions in grammar (our account is non-constructional).

(1) This is a *difficult* problem *for anyone to solve without help*.
(2) This problem is *too* complex *(for anyone) to understand*.
(3) This problem is *more* complex *than you can imagine*.

Previous work in LFG has touched on this phenomenon only tangentially. Other work can be grouped into three broad categories.

One kind of approach involves what are, from an LFG perspective, non-standard assumptions about headedness and selection. For example Kim and Sells (2011) would treat the degree word in a DDC like (2) as a functor selecting (and recursively combining with) an AP (e.g. *complex*), and a CP or VP dependent (*to understand*). Translated into LFG this would appear to require quite non-standard and unintuitive assumptions, inverting the relation of head and dependent. For example, in *too complex to understand*, which one would normally assume is adjectival, the main PRED would be that of the degree word *too*, and in *difficult problem to solve* (which one would normally assume is nominal) the main PRED would be that of the adjective *difficult*.

A second style of approach is exemplified by Flickinger and Nerbonne (1992), who propose a form of argument inheritance, where the subcategorisation requirements of the non-head daughter may be inherited by the mother. For example, the phrase *difficult problem* will inherit subcategorisation requirements from both *difficult* and *problem* and hence take a VP dependent (*to solve*). The spirit of this analysis could be captured in LFG as a form of syntactic complex predicate formation (Alsina, 1996; Butt et al., 2003). From an LFG perspective, the problem here is that complex predicate formation is standardly thought of as combining the PRED value of a head with the PRED value of its argument. But here what we need is a method of combining the arguments of a head (e.g. *problem*) with those of a non-argument – specifically, an *adjunct* (e.g. *difficult*), or *specifier* in the case of degree words.

The third approach, exemplified by Kay and Sag (2012), treats DDCs as involving a form of extraposition, analogous to extraposition from NP, as in (4).

(4) Then [a girl __] came in *who was obviously very pleased with herself*.

In the main part of the paper we develop an LFG implementation of this analysis. We are not aware of any well developed LFG accounts of extraposition, but a plausible starting point is to treat it as a purely c-structure phenomenon (so extraposed phrases have only their in-clause function, and are not associated with a discourse function) To deal with (1), the relevant c-structure rule might look like (5), DDCs involving degree words would involve a similar rule for AP.

(5) $NP \rightarrow NP \quad \begin{matrix} VP \\ \downarrow = (((\text{ADJ} \in)^* \uparrow) \text{COMP}) \end{matrix}$

The functional uncertainty constraint in (5) requires *for anyone to solve* to be complement of an adjunct of the head noun (or an adjunct of an adjunct, etc). See Figure 1.
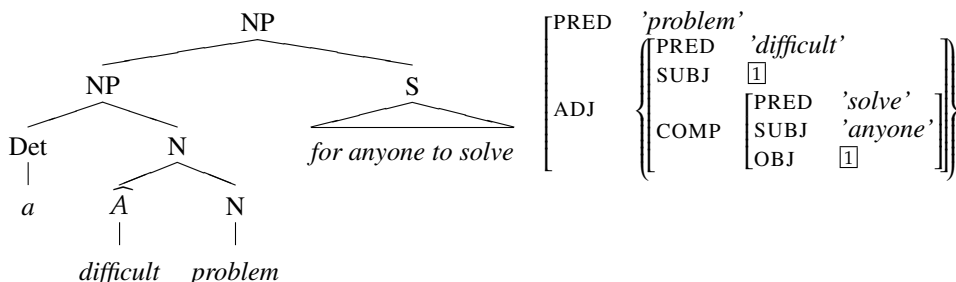

Figure 1:

The rule applies directly to an example like (6), if we assume that *more* is an adjunct of *interesting* (which is itself an adjunct of *problem*), and also to (7) and (8), which involve two instances of DD.

(6) a *more* __ complex problem *than others we have solved*.
(7) a [[[*more* __] [**difficult** __]] problem] **to solve** *than others*.
(8) a [[[*more* __] [**difficult** __]] problem] *than others* **to solve**

This approach seems promising, but it raises the question of why in the cases we are considering extraposition is obligatory, compare (9) (extraposition is normally optional):

(9) *a [difficult for anyone to solve] problem

Here we can appeal to the idea that pre-nominal (and pre-adjectival) positions are deficient in not allowing full phrasal categories (they are 'small', 'LITE', 'non-projecting', cf Toivonen (2003), and references there). For example, adopting the approach of Toivonen, we can explain the ungrammaticality of (9): *difficult for anyone to solve* is an AP, but it appears in a position restricted to $\widehat{A}$ (the non-projecting version of A).[1]

With this we can account for the fact that with *difficult* extraposition of complements is obligatory when it appears in pre-nominal position, as above, but it is not obligatory elsewhere, e.g. in (10). This is in contrast with a degree word like *too* for which it is obligatory *tout court*, see (11):

(10) This problem is *difficult for anyone to solve*
(11) *This problem is complex *too for us to solve*. (cf *too* complex *for us to solve*)

We can explain this, if we assume that while *difficult* lives a double life as both a non-projecting $\widehat{A}$ and a projecting A^0, *too* exists only as $\widehat{Deg}$ – which will mean it can never appear in a c-structure position with its complement.

Finally, we can account for the fact that most adjectives that take complements (e.g. *grateful*, *fond*, . . .) do not participate in DDCs, witness (12):

(12) *a *grateful* person *to her parents* (cf. a person grateful to her parents)

We must simply ensure that the PRED value of *grateful* that selects a complement is associated with the category A^0 (the form that appears without complements, i.e. with PRED 'grateful⟨SUBJ⟩' will be an $\widehat{A}$).

This account seems promising, but the LFG implementation still faces some challenges, which are explored in the full paper. In particular, the account relies crucially on functional uncertainty equations, which are in their nature independent. This is adequate for the cases above, which allow scrambling. But not all DDC licensors allow this: some (e.g. *so*) require their complement to be nested with respect to others (this is handled straightforwardly in the SBCG account of Kay and Sag (2012)):

(13) (The problem is) *so* <u>difficult</u> <u>to solve</u> *that we gave up*.
(14) *(The problem is) *so* <u>difficult</u> *that we gave up* <u>to solve</u>.

The solution to this problem is not obvious, and may involve significant extensions to the formalism (see e.g. Dalrymple and King, 2013).

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[1]Though in fact, considering this construction highlights the need for significant modification of Toivonen's proposal. She assumes $\widehat{X}$ categories do not project *any* c-structure. But it seems obvious that pre-modified $\widehat{X}$ categories have the same syntactic distribution as $\widehat{X}$ categories (e.g. *very difficult*, and indeed *more difficult* as in (7) and (8), have the same distribution as *difficult*), so we should allow $\widehat{X}$ to project $\widehat{X}$ (e.g. allow a rule like $\widehat{X} \rightarrow \widehat{Y}\,\widehat{X}$). This is addressed in the full paper.