SYNTACTIC CATEGORIES IN THE CORRESPONDENCE ARCHITECTURE

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Existing approaches to the notion of syntactic category in Lexical-Functional Grammar are either formally explicit but theoretically inadequate (Kaplan, 1987), or detailed but ill-integrated in the correspondence architecture (Bresnan, 2001; Toivonen, 2003). This paper develops a third approach: excising syntactic categories from the c-structure, modeling them as sets of privative features, and situating them in a corresponding x-structure. This allows for the elimination of X′ levels as theoretical primitives, while maintaining straightforward definitions of the notion of syntactic projection, of non-projecting words (Toivonen, 2003), and of endocentric structure–function mappings (Bresnan, 2001). An application of the system in the domain of paradigmatic morphology (Stump, 2001) is also suggested.

Kaplan (1987) formally models syntactic categories as part of the structural description of c-structure: a function λ from nodes to labels specifies a category label for each node. The labels are not structured, and there is no relation whatsoever between, say, the label V of n_1 and the label VP of its mother n_2. However, research since Chomsky (1970) has shown that phrase structure is best modeled in terms of syntactic projection: a lexical item projects dominating nodes whose categories are related to its own.

Bresnan (2001) develops a theory of syntactic categories that takes the research consensus into account: two binary features, ±PREDICATIVE and ±TRANSITIVE cross-classify the basic lexical category as in (1), a ternary distinction 0–1–2 defines X′ level, and another ternary distinction L–F–2F represents the distinction between lexical and functional categories. Thus a syntactic category is a quadruplet, as shown in (2a–c) for V, T′ and CP, respectively: these categories overlap in predicativity and transitivity, but differ in X′ level and lexicality–functionality.

(1)

	PREDICATIVE	TRANSITIVE
Verbal	+	+
Adjectival	+	−
Adpositional	−	+
Nominal	−	−

(2) a. V: {+PREDIC, +TRANS, 0, L}
b. T′: {+PREDIC, +TRANS, 1, F}
c. CP: {+PREDIC, +TRANS, 2, 2F}

These specifications then enter into the formulation of c- to f-structure mapping principles universal to languages with endocentric constituency. However, Bresnan eschews formalization of these categorial feature sets — as does Toivonen (2003), who extends the framework to non-projecting words — to the extent that Bresnan and Mugane (2006) revert to a Kaplan-type system in their treatment of Gĩkũyũ nominalization.

This paper argues for a formal solution in terms of simpler categorial feature sets, represented at a level of x-structure. In an x-structure set, let the presence and absence of the privative features *Pr* and *Tr* be respectively equivalent to a positive and negative value for PREDICATIVE and TRANSITIVE in (1), and let the presence and absence of *f* mean respectively a functional and lexical feature set. The licit combinations are shown in (3), along with their corresponding category labels for convenience, where ? stands for categories with no conventional labels in LFG.

(3)

CATEGORY TYPE	Verbal	Adjectival	Adpositional	Nominal
Lexical	V: $\{Pr, Tr\}$	A: $\{Pr\}$	P: $\{Tr\}$	N: $\{\}$
Functional	T: $\{Pr, Tr, f\}$	?: $\{Pr, f\}$	?: $\{Tr, f\}$	D: $\{f\}$

Now let χ be a correspondence function from nodes to sets, such that for each node $*$, the set $\chi(*)$ is its x-structure and $\chi(\hat{*})$ the x-structure of its mother. This is sufficient to formulate definitions for the notions *projecting node* (4a), *maximal projection* (4b), and *head* (4c), which can then be used to define a universal c-structure rule (5), with x-structure features inherited from words in the terminals. A non-projecting word in the sense of Toivonen (2003) is simply a lexical item specified for both (4b) and (4c).

(4) a. $Proj(*) \equiv \chi(\hat{*}) = \chi(*)$ Node's x-structure token-identical to mother's x-structure.
b. $Max(*) \equiv \neg Proj(*)$ Node's x-structure distinct from mother's x-structure.
c. $Head(*) \equiv \pi^{-1}(*) \neq \varnothing$ Node has an image in the string.

(5) $$n_i \longrightarrow \underset{Proj(*)}{n_j} \quad , \quad \underset{Max(*)}{n_k}$$

Thus the *projection* of a node becomes its *categorial domain* $\chi^{-1}(\chi(*))$, just as its *extended projection* (Grimshaw, 2000) is its *functional domain* $\phi^{-1}(\phi(*))$ (Bresnan, 2001). This categorial system, with no primitive notion of phrasal level, can be seen as an LFG version of Bare Phrase Structure (Chomsky, 1995), or the inheritance of CAT features via the Head Feature Principle (Pollard and Sag, 1994).

The system can be used to specify c- to f-structure mapping principles equivalent to those of Bresnan (2001): (6a) ensures that the nodes within a categorial domain are part of the same functional domain; (6b) ensures, via set restriction, that functional domains are extended across categorial domains like T–V or D–N; (6c) states that nominal and functional daughters of verbal and functional categories (that is, D daughters of T) will be f-structure SUBJs; and so on.

(6)

a. $Proj(*) \Rightarrow \uparrow=\downarrow$ A projecting node and its mother have token-identical f-structures.

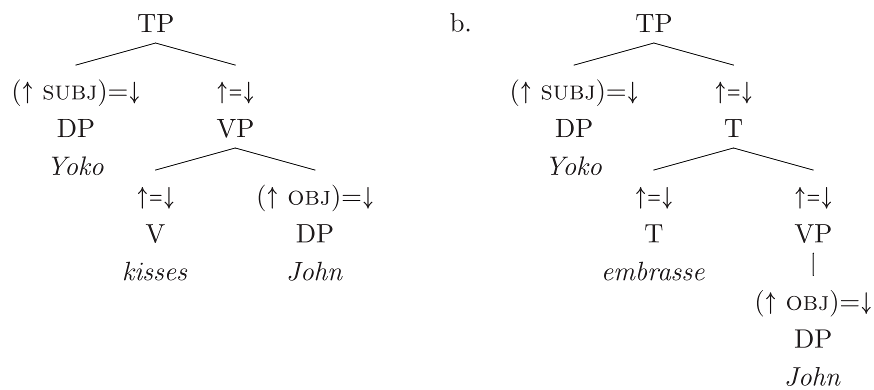
b. $\chi(\hat{*}) - \chi(*) = \{f\} \Rightarrow \uparrow=\downarrow$ A lexical node and its functional but otherwise identical mother have token-identical f-structures.

c. $Max(*)$, $\chi(*) = \{f\}$, $Max(\hat{*})$, $\chi(\hat{*}) = \{Pr, Tr, f\} \Rightarrow (\uparrow \text{SUBJ})=\downarrow$ The f-structure of a maximal projection of category D is the SUBJ in the f-structure of its category T mother.

d. ...

Assuming that the daughters in (5) are optional, then the minimal tree whose configuration satisfies (5), and whose functional annotations satisfy the set of principles partially stated in (6), and which defines both a SUBJ and an OBJ for a finite verb form, is the one in (7a) for English and the one in (7b) for French (assuming the results of Pollock, 1989). Note that all node labels in these trees abbreviate the x-structure feature sets in (3), and phrasal labels are used for nodes about which (4b) is true.

(7) a.



Hence the gain in explicitness, accompanied by a simplification of the categorial feature system and the elimination of X′ level primitives, comes at little cost in descriptive or explanatory power. Problems do remain: the system as stated here does not allow a definition of C that differentiates it from T, and adding a feature to do this would exacerbate the paradigmatic gap represented by ? in (3). An alternative, making x-structures multisets such that $\{Pr, Tr, f\}$ for T is distinct from $\{Pr, Tr, f, f\}$ for C, is directly compatible with (6b) in the sense that a T daughter of C would be annotated ↑=↓; however this would come at the cost of a still larger paradigmatic gap, since an x-structure like $\{Pr, Pr, Pr, Tr, Tr\}$ becomes possible absent additional restrictions. Nevertheless, categorial exuberance of this sort could be recruited in the specification of inflection classes, if the featural system was changed such that the x-structure of N was no longer defined as the empty set.

There are additional benefits. One is that x-structure equations are part of lexical entries right alongside the equations that define other structural levels like f- and a-structure. In consequence, one can envision the specification of a paradigmatic morphology (Stump, 2001) which treats all these equation types on an equivalent footing, and in which the equations serve directly as the morphological features, rather than being transduced from a separate set of such features as in Sadler and Nordlinger (2004). The upshot is an extension of paradigmatic realizational morphology into the category-changing derivational domain, or the domain of categorially mixed extended projections of the nominalization type seen in Bresnan and Mugane (2006); a sketch of these extensions will serve as proof of concept. Another benefit is a parallelism between this LFG conception of syntactic projection and that of other syntactic frameworks, which can facilitate cross-framework comparison and discussion.