In Olivier Crouzet, Hamida Demirdache, & Sophie Wauquier-Gravelines, eds. 2004. *Actes de / Proceedings of JEL 2004: Domain(e)s*. Nantes: AAI, 211-216.

Prolific Domains in the Computational System

Grohmann, K. K.

University of Cyprus
kleanthi@ucy.ac.cy
Department of English Studies, Kallipoleos 75, P.O. Box 20537, 1678 Nicosia, Cyprus

Abstract

With recent interest in partitioning clausal structure in various ways (split projections, phases, etc.), this paper contributes to the overall endeavour and argues for three *Prolific Domains* that are part of the computational system, interacting with the interfaces in a cyclic, piecemeal fashion: the lowest, Θ-Domain creates thematic relations, then the Φ-Domain licenses agreement properties, and finally the Ω-Domain establishes discourse information. Each Prolific Domain spells out upon completion. Some consequences of this framework for current theoretical thinking are discussed as well.

1 Introduction

The architecture of clause structure has undergone a number of refinements since the phrase-structure and early X'-Theory days. Particularly in the wake of Pollock (1989), the consensus preceding research in GB has reached was repeatedly changed. The *Barriers*-framework assumed a tripartite structure of the sort [CP [IP [VP]]] (Chomsky, 1986). Pollock and a host of scholars after articulated Infl/IP in terms of agreement phrases, a negation projection, aspectual heads, and so on. With Larson (1988), and then Hale and Keyser (1993), VP underwent a similar proliferation in terms of VP-shells (such as the light verb phrase *v*P). Rizzi (1997), finally, started a fruitful research program aimed at refining the structure of Comp/CP (to make room for topics, foci, Wh-phrases, and more). The framework presented in the following formalizes this intuitive tripartition and expresses it in a minimalistically digestible manner.

Today, the minimalist hardliner view adopts multiple specifiers and does away with what some see as superfluous projections, guided also by conceptual advances on phrase structure (which replaced X'-Theory with Bare Phrase Structure; Chomsky, 1995, 2000). Mainstream work considers only the "core functional categories" (*v*, T [I], C) and either sweeps problematic cases under the rug or bans them from syntax proper ("narrow syntax"). Moreover, many of the projections advocated in the past seem to play a role at the interfaces of syntax with (at least) semantics (focus), morphology/phonology (clitic), and discourse/pragmatics (topic) — without being "formal" enough to both allow syntactic encoding and survive the strict interface-driven computation (running from the lexical array/numeration to PF and LF).

2 Structure

Against this background, the present work aims at applying a broader perspective to clausal structure: the goal is to *structure* structure and consider some immediate consequences. For concreteness, I remain agnostic about detailed clause structure, i.e. about which or how many functional projections exist — let's just simply state that the research enterprises cited above suggest a split VP (Larson, 1988; Hale and Keyser, 1993), a split Infl (Pollock, 1989; especially Cinque, 1999), and a split Comp (Rizzi 1997). In this sense, *v*P, IP, and CP are *prolific* (they all contain more articulate structure). And more to the point, these three areas of the clause each form a *domain* of sorts. This, I take it, fundamentally underlies the *Barriers*-approach. What the verbal domain does is create thematic relations (external and internal arguments) — call this the Theta- or Θ-Domain. Likewise, the core purpose of the Infl-layer seems to be the licensing of agreement properties (possibly including Case) — call this the Agreement- or Φ-Domain. By analogy, Comp establishes discourse information (including licensing of operators, which I take to fall under discourse information at large) — the Discourse- or Ω-Domain. Let us summarize the formal tripartition into Prolific Domains as follows (by a loose definition and a complete identification):

In Olivier Crouzet, Hamida Demirdache, & Sophie Wauquier-Gravelines, eds. 2004. *Actes de / Proceedings of JEL 2004: Domain(e)s*. Nantes: AAI, 211-216.

(1) *Prolific Domain* (Grohmann, 2003a: 75)
A Prolific Domain is a contextually defined part of the computational system,
i. which provides the interfaces with the information relevant to the context and
ii. which consists of internal structure, interacting with derivational operations.

(2) *Clausal Tripartition* (Grohmann, 2003a: 74)
i. Θ-Domain: part of the derivation where thematic relations are created (roughly, *v*P)
ii. Φ-Domain: part of the derivation where agreement properties are licensed (roughly, TP)
iii. Ω-Domain: part of the derivation where discourse information is established (roughly, CP)

Under this view, any structural head is endowed with contextual information, namely one of *thematic* (|Θ|), *agreement* (|Φ|), or *discourse* (|Ω|). At each point in the derivation it is clear which of these contexts is evoked (by (1i)). The remainder of this paper will address the interaction with derivational operations and say something very brief on the issue of internal structure (as per (1ii)).

Regardless of the finer structure of each of these Prolific Domains, the *Barriers*-conception of clause structure in (3a) can now be recast as (3b), which also lists some of the projections that have been evoked in the literature. (This exposition must remain sketchy for reasons of space, without implying too many of the aforementioned proverbial rugs.)

(3) a. $[_{CP} \dots [_{IP} \dots [_{VP} \dots]]]$
b. $[_{\Omega\Delta}$ CP >> TopP >> FocP >> FinP $[_{\Phi\Delta}$ IP >> AgrP >> AspP $[_{\Theta\Delta}$ *v*P >> VP]]]

Since this approach essentially builds on the *Barriers*-structure, it might come as no surprise that something will have to be said regarding current work on cyclic derivations, which reintroduces another core concept of Chomsky (1986): barriers, or rather, bounding nodes (cf. Boeckx and Grohmann, 2004). The phase-driven view of the computation in current research (Chomsky, 2000 and subsequent work) holds that *v*P and CP are phases, subparts of the computation relevant for the operation Spell Out: *after* a phase is established, it gets spells out — namely at the point at which the next higher phase-head is inserted into the structure, and technically only a sub-part of the lower phase gets spelled out (see also Uriagereka, 1999 on multiple Spell Out). The approach developed here takes a slightly different view on this: Spell Out applies *at* each Prolific Domain — as soon as a Prolific Domain is formed it spells out. (Though I hasten to add that the idea of multiple Spell Out is not at all necessary in this approach.)

Essentially assuming a tripartite computation (see also Platzack, 2001), the derivation in this framework proceeds cyclically from Prolific Domain to Prolific Domain. Each Prolific Domain sends information contained within to the conceptual-intentional and sensorimotor interface components, PF and LF. Under the guiding minimalist desideratum that all operations applied to and conditions imposed on the computational system follow from bare output conditions (i.e. bear direct relevance to either LF or PF), I suggest the following locality condition:

(4) *Condition on Domain Exclusivity* (Grohmann, 2003a: 78)
An object O in a phrase marker must have an exclusive Address Identification AI per Prolific Domain ΠΔ, unless duplicity yields a drastic effect on the output.
i. An AI of O in a given ΠΔ is an occurrence of O in that ΠΔ at LF.
ii. A drastic effect on the output is a different realization of O at PF.

A strict reading of the Condition on Domain Exclusivity (henceforth, CDE) results in the ban of domain-internal movement for a simple, PF-driven reason: two copies of a chain/dependency within a Prolific Domain are uninterpretable at PF. Naturally, this condition can only be implemented if a Prolific Domain serves as the relevant structure to evaluate such information at the interfaces. In other words, if a Prolific Domain offers the relevant metric for Spell Out, the computational system can eliminate any derivation that involves two copies of the same syntactic object within a given Prolific Domain. Note that simple deletion of the lower copy, the usual procedure of a movement operation, does not yield a "drastic effect on the output" — at least not drastic enough to satisfy the CDE. (I will illustrate and explore the consequences of the CDE further in the next section.) Note also that the CDE immediately follows from bare output conditions in the sense that it directly impacts PF (and LF).

In Olivier Crouzet, Hamida Demirdache, & Sophie Wauquier-Gravelines, eds. 2004. *Actes de / Proceedings of JEL 2004: Domain(e)s*. Nantes: AAI, 211-216.

3 Anti-Locality

The purpose of the previous section was to introduce a new metric for evaluating structures relevant for the computational system of human language. Regardless of the finer architecture of each Prolific Domain, a Prolific Domain directly feeds the PF- and LF-interfaces. The CDE requires that no chain (or *dependency*, as I use the term) may be built within a single Prolific Domain — as a bare output condition with PF-relevance, this is motivated by the need of PF to assign a unique PF-matrix to a given linguistic expression. If a Prolific Domain is the relevant metric, the CDE boils down to what I call *anti-locality*: there is a minimum distance an element must move in the structure, namely across a Prolific Domain, and crucially not within one. In other words, we can conceive of anti-locality as a lower bound on locality: Domain-internal movement is ruled out. In this section, I will illustrate the concept and explore it further.

With the advent of minimalism (Chomsky, 1995) and the core desideratum that all conditions on the grammar be (virtually) conceptually necessary, much of the GB-machinery should be reconsidered (Hornstein, 2001). Regarding the ungrammaticality of (5a-c), for example, this would entail to explore the possibility of an alternative explanation, i.e. one without evoking filters of sorts (Theta Criterion, Case Filter, Affect Criteria, etc.) — recall the magic term of minimalist inquiry: Bare Output Conditions.

(5) a. *John likes.
b. *Him kissed her.
c. *Who, Mary detests?

Note that there is nothing intrinsically wrong with the examples in (5); they can all be construed in a way as to lead to the intended interpretation. For example, (5a) could be an instance where the agent and theme of *like* coincide (reflexivization). (5b) could be understood as the agent moving to both object and subject agreement positions, possibly to check both accusative and nominative case, and the theme could be assigned some default case value. Lastly, (5c) would be an instance of topicalizing a previously Wh-moved interrogative expression. The relevance parts of potential or purported, yet unacceptable derivations (marked by '#') are sketched in (6), where copies are indicated by strikethrough:

(6) a. #[$_{vP}$ John v^0 [$_{VP}$ likes-V^0 ~~John~~]]
b. #[$_{TP}$ him T^0 [$_{AgrOP}$ ~~him~~ AgrO^0 [$_{vP}$ softly [$_{vP}$ ~~him~~ v^0 [$_{VP}$ kissed-V^0 her]]]]]
c. #[$_{TopP}$ who Top^0 [$_{FocP}$ ~~who~~ Foc^0 [$_{TP}$ Mary T^0 detests … (~~who~~)]]]

GB had, of course, pretty straightforward accounts for the ungrammaticality of (5a-c), such as the Theta Criterion, generalized Affect Criteria (Wh-, Topic, and so on), or the Case Filter; however, there is no single condition that rules all of these out. Moreover, none of these filters can be characterized as bare output conditions, they are externally stipulated conditions with no immediate effect on LF or PF.

Now it could be said that bare output conditions are not a necessary ingredient of a theory of language. If this is the case, so be it. But in the interest of accepted cornerstones of minimalist research, we may want to keep this desideratum untouched. So, if a way of ruling out (5a-c) can be found that conforms to the desideratum that all conditions on the grammar be driven by interface requirements, it would arguably be a good thing. Likewise, one could object that there is no a priori need to rule out (5a-c) with a single condition; if it takes three conditions, it simply takes three conditions. But again, in accordance with the minimalist spirit of parsimony, economy, and ink-saving (Occam's razor), one might hold that *if* a single condition could be found, *then* such an approach would be superior over a three-account story.

As can be trivially observed, one property all of (5a-c) share is that the illicit movement step takes place within a single Prolific Domain. Thus the theme *John* moves from theme- to agent-, or Θ- to Θ-position in (5a), and in (5b) the agent *him* moves first to the position of object agreement, then to that of subject agreement, where the latter movement is anti-local in targeting a position within the Φ-Domain from a lower position within the same Φ-Domain. Likewise, topicalization of a moved Wh-phrase is ruled out by taking place solely within the Ω-Domain. Thus, the CDE rules out each of (5a-c) in a single step.

(For further explorations of the CDE, see Grohmann, 2003a, in particular the concept of Copy Spell Out, a repair strategy to the CDE, which is also discussed by Grohmann and Panagiotidis, this volume.)

In Olivier Crouzet, Hamida Demirdache, & Sophie Wauquier-Gravelines, eds. 2004. *Actes de / Proceedings of JEL 2004: Domain(e)s*. Nantes: AAI, 211-216.

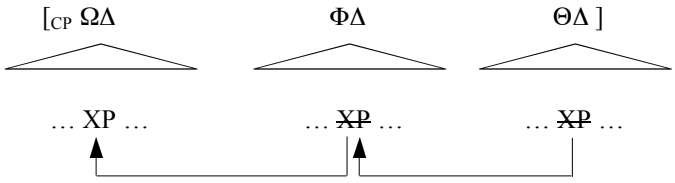
4 Locality

We have just seen that the CDE rules out movement internal to a given Prolific Domain; for discussion of the tripartite split within DP, i.e. the existence of the same three Prolific Domains in the nominal layer, see Grohmann (2003a: chap. 6), Haegeman and Grohmann (2003), Ticio (2003), and Grohmann and Panagiotidis (this volume). The lower bound on locality, anti-locality, rules out movement within a Prolific Domain. The question arises whether the Domain-driven approach might have anything to say about standard locality (qua upper bound). The most natural extension would arguably be that in order to be local and not to be anti-local, movement must target a position within the next higher Prolific Domain. I will indeed start with this assumption, expressed as the *Intra-Clausal Movement Generalization*:

(7) *Intra-Clausal Movement Generalization* (Grohmann, 2003b: 283)
$[_{\beta\Delta}$ XP … $[_{\alpha\Delta}$ … ~~XP~~ …]], where $\beta >> \alpha$

The Intra-Clausal Movement Generalization expresses the intuition that movement proceeds from a position within αΔ (some Prolific Domain) to a position within βΔ (some Prolific Domain), where α and β are different members of our set of context information {Θ, Φ, Ω}, β "immediately dominates" α (i.e. forms the next highest Prolific Domain), and both are within a single clause (hence *intra*-clausal). In other words, derivations within a single clause are maximally of the form sketched in (8). (Maximally meaning with respect to thematic arguments; if a linguistic expression originates in a higher position, like an aspectual or temporal adverb, it only undergoes the second movement, from the Φ- to the Ω-Domain, as arguably is the case of topicalized adverbials, at least in languages that involve a CP-layer here.)

(8)



Note that the Intra-Clausal Movement Generalization recreates the *Barriers*-derivation of a sentence like *Who did John kiss?* as sketched in (9a), for example, without running afoul of consequences resulting from Checking Theory and strong features, and without the need of adjunction-movement, as in (9b).

(9) a. $[_{CP}$ **who$_i$** did $[_{IP}$ John I $[_{VP}$ **t$_i$** $[_{VP}$ kiss **t$_i$**]]]
b. $[_{CP}$ **who$_i$** did $[_{IP}$ John I $[_{AgrOP}$ ~~**who$_i$**~~ $[_{VP}$ kiss ~~**who$_i$**~~]]]
Ω-Domain *Φ-Domain* *Θ-Domain*

Other instances of the Intra-Clausal Movement Generalization should by now be obvious: every left-peripheral argument (e.g., topic, focus, Wh-expression) must be generated in the Θ-Domain and move through the Φ-Domain; any non-fronted argument either stays *in situ* (Θ-Domain) or moves to the next higher Prolific Domain, the Φ-Domain (such as Case-movement). I will refrain from further illustration.

One consequence of this approach is that a VP-adverb must move through the Φ-Domain in order to target a left-peripheral or Ω-position. I leave open at this point where this should be subsumed under some form of Checking Theory or whether the intermediate touch-down is motivated some other way. Presumably, the latter approach will bear more fruit. Note that it has been adopted in generative analyses for a very long time. Consider long-distance Wh-movement, for example, where the intermediate touch-down at the "escape hatches" (intermediate SpecCP-positions) is motivated solely by locality concerns.

The framework programmatically sketched here should thus be taken as a first step of bringing standard locality considerations (qua upper bound on the distance an element may move) in unison with anti-locality considerations (qua lower bound). If locality, which ever way to be formulated at the end, drives limitations on distance (if this approach is on the right track, in both directions!), as is assumed widely in the literature, the grammar seems to make available ways to move that differ from strict checking-based approaches. Something very similar in spirit also surfaces in recent work by Chomsky (2000 *et seq.*).

In Olivier Crouzet, Hamida Demirdache, & Sophie Wauquier-Gravelines, eds. 2004. *Actes de / Proceedings of JEL 2004: Domain(e)s*. Nantes: AAI, 211-216.

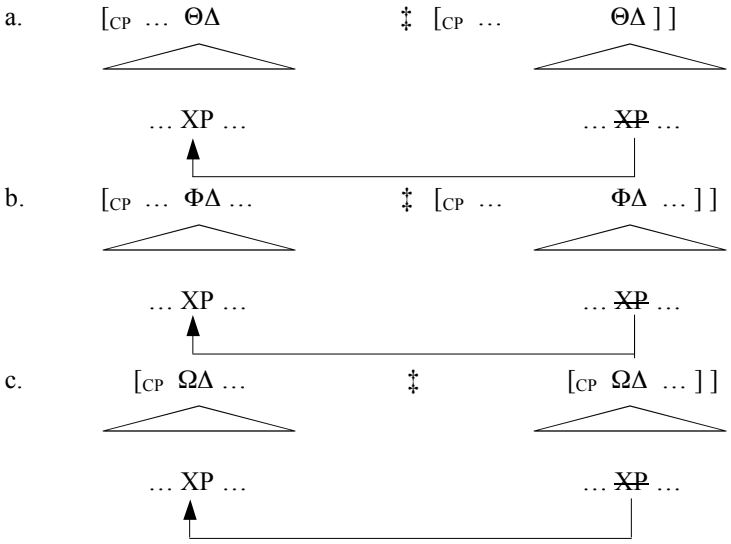
5 Cyclicity

The second step consists in a consideration of longer dependencies in a new light (thus connecting to the aforementioned long-distance Wh-dependencies). In recent work (Grohmann, 2003a-b), I proposed and defended the *Inter-Clausal Movement Generalization*, according to which a linguistic expression may move across clause boundaries only by moving into the *same type* of Prolific Domain in the target clause, that is, from Θ- to Θ-Domain (under a natural implementation of a movement approach to control as in e.g. Hornstein, 2001), from Φ- to Φ-Domain (as in standard analyses of raising structures), and from Ω- to Ω-Domain (as in long-distance Wh-movement, also on very standard assumptions). Consider (10):

(10) *Inter-Clausal Movement Generalization* (Grohmann, 2003b: 285)
$[_{\alpha\Delta}$ XP … ‡ … $[_{\alpha\Delta}$ … ~~XP~~ …]], where ‡ = clause boundary

Here αΔ indicates some Prolific Domain, identical in source and target clause. In other words, we would expect movement across clause boundaries to look as sketched below — in the three phenomena mentioned above from Spec*v*P to Spec*v*P (Θ-to-Θ as in subject control), from SpecIP to SpecIP (Φ-to-Φ as in subject-to-subject raising), and from SpecCP to SpecCP (Ω-to-Ω as in long Wh-movement).

(11)



This generalization adds an interesting twist to the notion of successive cyclicity (around and employed for a long time), deriving it as a property of the computational system rather than by applying external factors on the derivation (such as the EPP or the notion of escape hatches). It also allows for a unification of derivational histories for otherwise unrelated phenomena, such as the A/A'-distinction, which cannot be formulated in minimalist approaches (see Grohmann, 2003b for more). The upshot of this discussion is that successive cyclicity finds a natural home in a Domain-driven framework, as expressed through the two generalizations on intra- and inter-clausal movement from (7) and (10), respectively — and the empirical justification of these generalizations should be apparent from at least the *Barriers*-framework.

Now that the basic intuition of the Domain-driven view of a tripartite syntactic computation has been laid out (where Spell Out applies *at the time* when a Prolific Domain is complete), let me compare it with the recent phase-based system of Chomsky (2000 *et seq.*). We can note first that both, the concept of a Prolific Domain and the concept of a phase, justify a clausal division of sorts. A phase is motivated propositionally, a Prolific Domain contextually. However, IP does not count as a phase (only *v*P and CP are strong phases), whereas Prolific Domains come in threes: thematic, agreement, and discourse.

Both arguably play a role for the derivation in being possibly convergent (inducing Spell Out). The evaluation of Spell Out differs, though, in being not so local (phases: *after* the next phase-inducing head enters the derivation, the lower phase spells out) vs. strictly local (at the creation of a Prolific Domain).

Lastly, both have an effect on the computation. Syntactic operations in the phase-based framework are subject to the Phase Impenetrability Condition, whereas the Domain-driven approach employs the CDE. Details differ, of course, but that is only to be expected. (I leave further discussion for future interest.) One point in which the two diverge again is the introduction of a long-distance checking operation Agree (on top of the trigger for checking, Attract) in the phase-based system vs. the single operation Move, i.e. a system in which there is neither long-distance checking nor attraction of a higher element, but simply the need of a lower expression to move up (leading to local evaluation). In this respect it should be noted that multiple specifiers are indispensable for the phase-based approach, which makes crucial reference to an edge (of a phase) out of which further extraction is allowed. This is not so for the Domain-driven system, in which unique specifiers may be kept, since there is no crucial edge.

6 Conclusion

This paper presented a formal tripartition of clausal *and* nominal structure in terms of Prolific Domains. These are understood as units of the computational system that are relevant for the interfaces and as such are being spelled out upon completion. Some of the more technical consequences of this framework were addressed, in particular how it stands in addition/complementarity to dynamic alternatives (especially the phase-based approach to the computation) and what new light may shed on successive-cyclic movement.

It should be kept in mind that the above presentation represents a brief and incomplete summary of two lengthy pieces of work (Grohmann, 2003a-b) which furthermore have recently been adopted for further investigations in the nominal domain (Grohmann and Haegeman, 2003; Ticio, 2003; Grohmann and Panagiotidis, this volume) — yet, the Domain-driven framework leaves many questions and issues to be addressed (whether problematic or straightforward) and as such constitutes a programmatic sketch.

References

Boeckx, C. and K.K. Grohmann (2004) Barriers and Phases: Forward to the Past? Ms., Harvard University, Cambridge, Mass. and University of Cyprus, Nicosia.

Chomsky, N. (1986) *Barriers*. Cambridge, Mass.: MIT Press.

Chomsky, N. (1995) *The Minimalist Program*. Cambridge, Mass.: MIT Press.

Chomsky, N. (2000) Minimalist Inquiries: The Framework. In R. Martin, D. Michaels, and J Uriagereka (eds.), *Step by Step. Essays on Minimalist Syntax in Honor of Howard Lasnik*. Cambridge, Mass.: MIT Press, 89-155.

Cinque, G. (1999) *Adverbs and Functional Heads. A Cross-Linguistic Perspective*. Oxford: Oxford University Press.

Grohmann, K.K. (2003a) *Prolific Domains. On the Anti-Locality of Movement Dependencies*. Amsterdam: John Benjamins.

Grohmann, K.K. (2003b) Successive Cyclicity under (Anti-)Local Considerations. *Syntax* 6, 260-312.

Haegeman, L. and K.K. Grohmann (2003) Resuming Reflexives. *Nordlyd* 31, 46-62.

Hale, K. and S.J. Keyser (1993) On Argument Structure and the Lexical Expression of Grammatical Relations. In K. Hale and S.J. Keyser (eds.), *The View from Building 20. Essays in Honor of Sylvain Bromberger*. Cambridge, Mass.: MIT Press, 53-110.

Hornstein, N. (2001) *Move! A Minimalist Theory of Construal*. Oxford: Blackwell.

Larson, R.K. (1988) On the Double Object Construction. *Linguistic Inquiry* 19, 335-392.

Platzack, C. (2001) Multiple Interfaces. In U. Nikanne and E. van der Zee (eds.), *Cognitive Interfaces. Constraints on Linking Cognitive Information*. Oxford: Oxford University Press, 21-53.

Pollock, J.-Y. (1989) Verb Movement, UG and the Structure of IP. *Linguistic Inquiry* 20, 365-424.

Rizzi, L. (1997) The Fine Structure of the Left Periphery. In L. Haegeman (ed.), *Elements of Grammar: Handbook of Generative Syntax*. Dordrecht: Kluwer, 281-337.

Ticio, E. (2003) *On the Structure of DPs*. Doctoral dissertation, University of Connecticut, Storrs.

Uriagereka, J. (1999) Multiple Spell Out. In S.D. Epstein and N. Hornstein (eds.), *Working Minimalism*. Cambridge, Mass.: MIT Press, 251-282.