Deriving the Functional Hierarchy

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1 Introduction. There is a tension between Chomsky's recent Minimalist theory and the cartographic program initiated by Cinque. Cinque's cartography argues for a large number of fine-grained categories organized in one or more universal Rich Functional Hierarchies (RFH). The subtlety of the evidence and the richness of the inventory virtually force an innatist approach.

In contrast, Chomsky argues for a minimal role for UG (MUG), shifting the burden to extralinguistic cognition, learning, and what he calls third factor principles such as principles of efficient computation. In this paper we reconcile the austere MUG vision of Chomsky with the impressive empirical evidence that Cinque and others have presented for RFH.

We argue (building on previous work) that some Cartographic work overstates the universality of the orders observed, and furthermore conflates several different ordering sources. Ordering sources include scope (cf. Ernst 1992, ch. 3 on *frequently*), polarity (cf. Nilsen 2003 on *possibly*), and semantic category (cf. Jackendoff 1972, McConnell-Ginet 1982 on V-level and S-level adverbs).

Once these factors are properly understood, there remains an irreduceable universal functional hierarchy, for example that which orders epistemic modality and tense over root modality and aspect, and that which orders the latter over argument structure and Aktionsart (as discussed in much previous work, e.g. Bybee, Smith).

This residual core functional hierarchy (CFH) is unexplained so far by work which follows MUG. Rather than simply stipulating the CFH as part of UG, we reconcile CFH with MUG by detailing what nonlinguistic cognition must look like in order for MUG to derive the CFH. We furthermore show how an individual language develops a language-specific RFH which is consistent with the universal CFH.

- **2 Our Empirical Domain.** To ground and illustrate our general proposal, we present a specific analysis of a classic problem from the phrase structure of English: Auxiliary ordering, illustrated in (1). In (2) we show a version of the original affix hopping analysis from Chomsky (1957), and in (3) we present its cartographic alternative.
- (1) John might have been being chased.
- (2) John [might $+ \emptyset$ [have + EN [be + ING [be + EN [chase]]]]] (Chomsky 1957)

The problem with (2) is that it encodes no general or universal claim, but is simply a hierarchical representation for the particular given morphemes. The problem with (3) is it simply repeats these morphemic tags in the labels for the functional items proposed and does not ground them semantically. It also explicitly advocates a view of phrase structure which is the conjunction of the morphemes and pairwise orderings that could be established across all the languages investigated. This view takes the hierarchization of function so seriously that even when the 'same' lexical item is found in two possible word order positions, the assumption is that there are two distinct heads, but that for some reason certain lexical items can merge equally well in more than one position. Cinque (1999) does not of course advocate rampant homonymy; he argues that certain adverbs for example, or modals, have general enough semantics that they are compatible with more than one categorial functional head and have their meaning modulated according. However, this opens up the possibility that a worked out version of the semantics of these items, together with an

understanding of the semantic type(s) of the constituents they combine with could deliver the required ordering and interpretation without the extra Cinquean functional heads (see e.g. Ernst 2002 for such an attempt). In this paper we present a concrete analysis of English auxiliary ordering that is designed specifically to motivate a particular CFH for the verbal extended projection, and show how the richer ordering evidence from Cinque can nevertheless be reconciled with it.

3 Ontology and Category. The CFH, we argue, has its basis in a semantic ontology of 'sorts' which is finer-grained than commonly assumed. One important part of this is a three-way distinction among events, situations, and propositions, building on work by Kratzer, Giorgi & Pianesi, Hacquard, and others in our theory of the semantics of the clause. The semantic ontology, we argue, has its roots in turn in extralinguistic cognition. Language constructs categories which are compatible with this extralinguistic component in their organization, for example a VP is an event description, a TP is a situation description, and a CP is a proposition, and as a result of the containment relation among those entities, C > T > V.

Consider in the light of our English example given in (1) above which exemplifies Epist > Perf > Prog > Pass. Epist[emic modality] must dominate the others because it is only defined at the propositional level. Perf[ective aspect] must be in the situational domain, below the propositional domain, because it involves temporal precedence, only statable at the level of the situation, according to our assumptions (as motivated by Barwise & Perry and other previous work). Prog[ressive aspect] could in principle be part of the situational or eventive domain, depending on whether it is essentially an aspect or essentially an Aktionsart. We show that in English, it interacts with event semantics, and hence must be in the VP-domain, below Perf. Pass[ive] involves argument structure, and hence is also clearly part of the VP.

A certain subset of ordering properties is built on this substrate. However, elements within the same sortal domain can be shown to exhibit ordering flexibilities with attendant semantic differences which can be attributed to scope. We analyze examples of adverbial ordering which we argue feed off the rigidity of sortal embedding, and contrast them with other cases where adverbial ordering flexibilities derive from scopal interactions within sort. Thus, for example, a manner adverb like quickly names an attribute of an event, hence attaches at the VP level, while an aspectual adverb like already is part of a description of a situation and hence can only attach at the TP level. This captures and in fact derives the basic intuition behind the category-based orderings discussed by Jackendoff, McConnell-Ginet, and Ernst, among others.

The finer-grained orderings seen in the RFH are captured in this model without the need to postulate as many semantic categories as there are positions in the RFH; in other words the RFH has a distinct source from the CFH. We show that the positions in the RFH are not as universal as they have been made out to be. Some of the orderings of the RFH are due to scope or polarity, as mentioned above, and others we ascribe to selection. We argue that category selection is part of how language organizes categories, with the effect that essentially functional considerations may lead to rigid language-specific orders (along the lines discussed by Horn 1989 for modals and negation).

3 Consequences. The reconciliation that we propose of Chomsky's MUG with Cinque's RFH has important consequences. Work which adheres closely to the Minimalist C-T-v-V template for the clause can explain only a tiny part of the observed hierarchy, e.g. {Epist, Perf} > {Prog, Pass} (by C > v); Chomsky argues that all syntactically relevant features come from the phase heads and are distributed within the phases by Inheritance. There is no motivation for ordering within either of the two phasal domains. Cartographic work, on the other hand, places no limits on the stipulated hierarchy but cannot provide a phylogenetic source for it. By distinguishing CFH from RFH, our compromise retains the austere and conceptually attractive MUG assumption without forcing us to say that most of grammar is a matter of 'externalization' or 'usage' or simply relegating it to unspecified 'interface conditions.'