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Long-standing issues in adjective order and corpus evidence for a multifactorial approach

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Abstract: In this paper, we introduce the issue of adjective order and show that different approaches vary in their answers to the question of how fine-grained the semantic categories determining adjective order are. We report on a corpus study that we conducted and that illustrates that a clear answer to the question of what general factors exactly determine adjective order is elusive, given the multifactorial nature of the problem. We then present the individual contributions to this special issue, and how they attempt to add new observations from Germanic languages to the general issues revolving around the topic of adjective order.

Keywords: adjective order, corpus distribution, Germanic languages, sectivity, semantic hierarchies

1 General issues in the study of adjective order

The issue of adjective order has a long history in linguistics. As early as in 1933, Bloomfield remarked on the robust pattern of size adjectives usually preceding color adjectives (*a small black dog* vs. *a black small dog*). Following these early notes, many researchers in linguistic theory investigated adjective order in the form of semantic hierarchies (Dixon 1982; Bache and Davidsen-Nielsen 1997). In addition, early psychological studies explored how frequent co-occurrence between an adjective and a noun may contribute to them becoming fixed expressions, with fixed orders (see Martin 1969 et seq.). Other cognitive studies elaborate on the notion of ‘apparentness’, where an adjective denoting a cognitively apparent quality requires fewer computations in order to be processed than an adjective

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denoting a less apparent quality (e.g., Sproat and Shih 1987, 1991). Some researchers have recently argued along similar lines again, namely that more subjective adjectives are uttered first in languages with prenominal adjectives (Scontras et al. 2017). By assuming this cognitive basis for ordering restrictions, such approaches connect specifically linguistic knowledge (interpreting the semantics of an adjective) to general cognitive mechanisms (detecting perceptual features), abstract communicative constraints (Fukumara 2018; Hahn et al. 2018), or developmental issues (Bar-Sever et al. 2018).

The topic of adjective order thus offers many perspectives on fundamental problems in linguistic theory. A central one is how a semantically hierarchical concept (say, a dog with two attributes) can be transformed into a linear string (*a small black dog* vs. *a black small dog*), and what level of representation governs this transformation: Is it the conceptual properties denoted by the adjectives, or is it their semantic categories, or syntactic factors? What is the adequate grain size for characterizing adjectival behavior? Finally, how does the way speakers order their adjectives reveal mechanisms of information structure (e.g., *a BLACK small dog* vs. *a SMALL black dog*)? These, sometimes subtle, contrasts have been noted in the literature for a long time. For instance, Vendler (1968: 130) points out that such “inverted phrases usually are uttered with a strong emphasis on the first adjective.”

In addition to those semantically or cognitively motivated explanations to adjective order, syntactic theory has also developed transformational models of the phenomenon. A major motivator for those theories were cross-linguistic perspectives, which had to account for the fact that adjectives can occur both pre- and postnominally in many languages, and that this ordering pattern seems to correlate with different semantic types of adjectives. A detailed examination of this fact about natural languages can shed light on the semantic categories that are relevant for ordering patterns in general. One of the first attempts to investigate this syntactic reflex of semantic distinctions has been made by Cinque (1994). Cinque (1994: 88) elaborates on the fact that attributive adjective phrases (APs) can occur both pre- and postnominally in Romance:

- (1) a. *La loro **brutale** aggressione all'Albania.*
(‘It was brutal of them to attack Albania.’)
- b. *La loro aggressione **brutale** all'Albania.*
(‘They attacked Albania in a brutal manner.’)

As already noted by Jackendoff (1972), and indicated in (1), the postnominal position receives a strict manner interpretation, while the prenominal one has a ‘subject-oriented’ interpretation, as indicated by the different paraphrases in (1).

Accordingly, assuming a generative approach to syntax, Cinque (1994) argues that the noun (N) obligatorily raises to a head higher than the manner AP position, but cannot raise past the position of subject-oriented APs, as exemplified in (2a) by *stupida* (for problems and more recent refinements of this analysis, see Cinque 2010; Laenzlinger 2005):

- (2) [AP_{subj-or} – [AP_{manner} – [NP N]]]
- (3) a. **L'aggressione **stupida** brutale all'Albania*
 b. *La **stupida** aggressione brutale all'Albania*

Scott (2002) adopted Cinque's approach that the adjectival domain can be split in distinct functional projections (in [2], 'AP_{subj-or}' and 'AP_{manner}'). According to his rigid adoption of the so-called 'cartographic approach', the syntax provides a fine-grained representation, a detailed 'map', that accounts for the deviance/markedness of examples like ??*a red heavy good table*. He proposes the following hierarchy of functional projections (Scott 2002: 102):

- (4) [DP *the/this* [Subj.CommentP *nasty* [SizeP *big* [LengthP *long* [HeightP *tall* [SpeedP *fast* [WidthP *fat* [WeightP *light* [TemperatureP *hot* [AgeP *modern* [ShapeP *round* [ColourP *dark* [Nationality/OriginP *German* [MaterialP *brass* [NP ...

In proposing this syntactic map, Scott (2002) relies on semantic hierarchies that were already proposed in the typological literature (see Dixon 1982: 1–62; Hetzron 1978). Crucially, in the typological literature there is no agreement as to the question of how many semantic categories of adjectives there are – and even if we assume a fixed set of categories, the issue of what the precise order of these categories is, remains, despite its long research tradition, an open issue.

It might be argued that detailed hierarchies like the one proposed by Scott (2002) have a flavor of arbitrariness. With respect to this arbitrariness, Truswell (2009) demonstrated that Scott's hierarchy undergenerates attested adjective orders. Based on a systematic Google search, he finds examples for various orders that contradict the proposed hierarchy (for instance, [ColourP *red* [MaterialP *wooden* [NP *clogs*]]) and [MaterialP *wooden* [ColourP *red* [NP *clogs*]]) seem to be well attested).

Like Cinque (1994) and Scott (2002), Truswell does not claim, however, that adjective order is completely free. He refers to the distinction between intersective and subsecutive adjectives (see Kamp and Partee 1995). Specifically, he shows that both free orders of intersective pairs (5a) and of subsecutive pairs (5b) are possible. However, while subsecutive adjectives can precede intersective

adjectives (5c), intersective adjectives do not precede subsective adjectives (5d). Accordingly, Truswell proposes a restriction that can be described as in (6).

- (5) a. *wooden red clogs* – *red wooden clogs*
 b. *new big cuts* – *big new cuts*
 c. *big wooden bridge* – *new wooden piles*
 d. ??*French big feline* – ?? *French new site*

- (6) $[_{DP} D [_{XP} AP^*subsective X [_{NP} AP^*intersective N]]]$

Truswell (2009) thus hypothesizes that recursion of APs (indicated by “**”) is allowed within the class of subsective and intersective APs, respectively, thus allowing more flexible adjective stacking than cartographic approaches do. However, while Scott’s system might undergenerate, it remains open whether Truswell’s proposal might overgenerate and needs to be refined.

In sum, it is fair to conclude that restrictions on adjective order are widely acknowledged in linguistics. However, it is still not clear which approach provides an adequate balance between over- and undergeneration of the attested data. The consensus in the literature is that there are ordering restrictions in adjectival ordering and that, at whatever abstract level, these ordering restrictions might be universal or at least fairly wide-spread. Accordingly, the topic can fruitfully be approached from a comparative perspective.

This special issue of *Linguistics* brings together recent work from different theoretical perspectives to shed more light on the ordering restrictions that exist within Germanic languages and varieties. Specifically, the volume contains four papers investigating adjective order from both more formally framed and more functionally oriented accounts. These approaches differ in their answers to the question of how fine-grained the semantic categories determining adjective order are. Before we introduce the individual contributions below, we briefly report on a corpus study that we conducted and that illustrates that a clear answer to the question of what general factors exactly determine adjective order is elusive, given the multifactorial nature of the problem.

2 Corpus evidence for a multifactorial approach

In the following corpus study, we investigated word order in combinations of English SIZE/SHAPE adjectives with COLOR adjectives, such as *big blue* and *circular blue*. In the literature, on the one hand, fine-grained syntactic hierarchies postulate an ordering rule SIZE > SHAPE > COLOR; this rule predicts that both

SIZE and SHAPE adjectives preferably precede COLOR adjectives (see Scott's 2002 claim above and, e.g., Laenzlinger 2005). As we discussed in the context of Truswell (2009), a rivaling approach states that fine-grained ordering restrictions are less relevant and claims that only a broader semantic difference in terms of selectivity matters for adjective order. Still other accounts view adjective order as the product of broader cognition, such as accessibility (operationalized as frequency, see Wulff 2003).

Ordering phenomena have increasingly become an object of quantitative study, most notably in the work of Benor and Levy (2006) and Morgan and Levy (2015, 2016), both of which used statistical models to tease apart the relative weights of different rules contributing to ordering preferences in binomial expressions like *bread and butter* and *bishops and seamstresses*. The advantage of using such computational models, as Morgan and Levy (2015, 2016) show, is that they can both identify the complex interaction of different generative rules, and their relative weight; another advantage is that cognitive constraints governing true exceptions can clearly be identified as such.

To arbitrate between hierarchical, semantic, and cognitive accounts of adjective order, we collected a corpus of adjective combinations by choosing 53 SIZE/SHAPE adjectives and 43 COLOR adjectives. Adjectives that are homonymous with nouns (e.g., *square*, *navy*) were not included in this list. Our choice of COLOR adjectives takes into account that some COLOR adjectives denote subsective properties (e.g., *bright* in *bright sunset* vs. *bright jeans*). In sum, our material reflected the large-scale semantic distinction between intersective (7) and subsective denotations (8) as follows¹:

- | | | | |
|-----|----|---|-------|
| (7) | a. | <i>blue car</i> = <i>blue</i> \cap <i>car</i> | COLOR |
| | b. | <i>circular table</i> = <i>circular</i> \cap <i>table</i> | SHAPE |
| (8) | a. | <i>big car</i> \subset <i>car</i> | SIZE |
| | b. | <i>bright jeans</i> \subset <i>jeans</i> | COLOR |

Following Morgan and Levy (2015, 2016), we obtained bigram counts for every pair of adjectives in both possible orders from the Google n-gram corpus, only taking into account bigrams that occurred more than 100 times. We ordered each pair in alphabetical order to create a dependent measure of preference strength from 0 (always non-alphabetically ordered) to 1 (always alphabetically ordered). Since there is no reason to believe that alphabetical order is a rule that applies to adjective

¹ In our classification, we abstracted away from context sensitivity and related issues (see McNally and Boleda 2004; Partee 2010).

ordering preferences, we would expect a preference strength of about 0.5 for any given pair: That number would indicate that one is equally likely to encounter *black small dog* as *small black dog*. However, if there are strong preferences in either the alphabetical order (*black small dog*) or the reversed alphabetical order (*small black dog*), this number will shift towards 1 or 0. By including different predictors, or hypotheses about such rules, in the model, we can investigate the relative weight of each rule. The predictors we included were (a) the difference in logarithmic frequency between adjectives, (b) sectivity (hand-coded), and (c) semantic categories (SIZE/SHAPE vs COLOR). We also included a random intercept for the specific adjective pair, regardless of its order, to abstract away from item-specific effects.

We expected different effects for each factor. Since frequent adjectives are usually more easily cognitively available, more frequent adjectives were expected to be uttered first. We also expected to replicate sectivity effects such as observed by Truswell (2009), and that SIZE/SHAPE adjective should precede COLOR adjectives (Scott 2002). We did not necessarily predict any interaction of these effects, both because they are often correlated with each other, and because there is no principled reason why, say, frequency should affect inter-sective adjectives differently from subsective adjectives.

As expected, we found significant effects of all predictors: There is a preference for intersective adjectives to come first (log-likelihood: 1.5; $\beta = 1.74$, $p < 0.0001$), a preference for color adjectives to be closer to the noun (log-likelihood: 1.39; $\beta = 1.07$, $p < 0.0001$), and, independently of the adjective category, more frequent adjectives tend to be produced first (log-likelihood: 1.08; $\beta = 0.52$, $p < 0.0001$). The sectivity effect was larger than the semantic category effect, which was larger than the frequency effect, as indicated both by the β -coefficient and the magnitude of change in log-likelihood when one factor at a time was removed from the model (Levy 2014). No two- or three-way interactions reached significance. Figure 1 below shows the raw counts broken down by sectivity.

In sum, our results show that both very broad categories, such as sectivity, and finer-grained semantic distinctions, such as the denotated quality of the adjectives, have independent roles to play in determining adjective ordering preferences. We can also show that when adjectives are more frequent, and thus likely more accessible in text or speech production, they tend to be produced first, above and beyond any other grammatical ordering rules. This confirms adjective order as a paradigm case of interaction between factors within the linguistic systems, as well as general cognitive systems outside of the language faculty. In what follows, we present the individual contributions to this special issue, and how they attempt to model this interplay and to add new observations to the general issues revolving around the topic of adjective order from a comparative Germanic perspective.

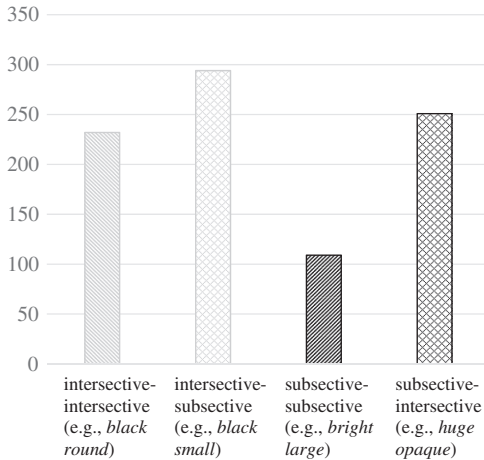


Figure 1: Raw counts of two-adjective occurrences, broken down by sectivity.

3 The contributions

Our empirical investigation sketched in Section 2 indicated that both large-scale and more fine-grained semantic distinctions might be relevant for adjective order. The papers of this special issue explore the relevance of these distinctions from different theoretical perspectives and for different Germanic varieties: The first paper investigates a Germanic language, Cimbrian, that features both pre- and postnominal attributive adjectives. Given this clear syntactic (ordering) reflex of different types of adjectives, this paper investigates adjective order from a formal syntactic perspective. By contrast, the next three papers explore adjective order from a functional perspective by focusing on ordering in the prenominal domain only. These contributions provide accounts of adjective order in German and both historical and present-day English.

The first contribution by Ermenegildo Bidese, Andrea Padovan, and Claudia Turolla focuses on morpho-syntactic features of adjective order and investigates Cimbrian, a German-based minority language currently spoken only by the inhabitants of Luserna, in the province of Trento (Italy). In their contribution “Adjective orders in Cimbrian DPs,” they thus take a language-contact perspective and provide empirical evidence for the hypothesis that Cimbrian behaves like German, but nevertheless allows for a subclass of adjectives to appear in postnominal position. In particular, they demonstrate that adjectives following the head noun are predicative rather than attributive and support this claim by the fact that postnominal modifiers do not show up with inflection.

In contrast to this generative contribution, Sven Kotowski and Holden Härtl take a semantic-functional perspective. In their contribution, “How real are adjective order constraints? Multiple prenominal adjectives at the grammatical interfaces,” they argue against approaches that locate constraints on adjective order in the grammar. Specifically, they claim that preferences in this domain are governed by general cognitive principles and large-scale semantic distinctions that should not be part of core grammar. Kotowski and Härtl present three studies on German: a corpus study supporting their claims, and rating studies showing that although there are strong preferences in adjective order, there is still a lot of variability that is not captured by fine-grained syntactic accounts.

Like Kotowski and Härtl, Elnora ten Wolde adopts a functional perspective. Her paper “Linear vs hierarchical: Two accounts of premodification in the *of*-binominal noun phrase,” enriches the question of adjective order with another structural possibility within noun phrases, namely *of*-binominals, such as *a beast of a man*, and the adjective ordering options within such phrases (*a {dangerous, tall} beast of a {dangerous, tall} man*). She shows, based on analyses of contemporary and historical corpora of English varieties, that ordering restrictions of prenominal adjectives increase relative to the degree of grammaticalization. Furthermore, the functional model she proposes takes into account the broad semantic distinction between subjective and objective adjectives.

In a similar vein, the last contribution to this special issue “A cognitive-functional approach to the order of adjectives in the English noun phrase” by Kristin Davidse and Tine Breban offers a different perspective on adjective order than the formal syntactic approaches sketched in our introduction above. Specifically, the authors present a model of ordering preferences in the tradition of functional grammars. In corpus studies of historical and present-day English, Davidse and Breban investigate ordering preferences for two types of adjectives: descriptive modifiers and interpersonal modifiers, similar to the subjective-interjective distinction introduced in Section 1 above. In addition to the functions of classifier, epithet, noun-intensifier, and secondary determiner, Davidse and Breban include two further functions, categorization evaluators and focus markers, and show that the dependent element is typically positioned to the left of the element it is dependent on.

Evidently, both the theoretical perspectives and the empirical domains of the papers in this special issue vary. Nevertheless, two broad set of questions have been identified and addressed in each paper: First, what is the division of labor between syntax, morphology, and semantics in adjective ordering, what are the theoretical and empirical predictions from different models, and how could we test them empirically? Second, which properties of adjective order

must be 'hard-coded' within the linguistic system, and which might fall out of grammar-external factors? These two questions are recurring themes of the special issue. The topic of adjective order has received much attention by linguists working within both functional and generative frameworks (see, e.g., Cinque 2010, 2014 for a generative syntactic approach; Feist 2012; Kotowski 2016 for recent functional-cognitive accounts); this volume brings together different theoretical perspectives on new relevant phenomena that can be observed within the Germanic language family.

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