Review: Anna Szabolcsi (ed.) *Ways of Scope Taking*, Kluwer, Dordrecht, 1997.

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The papers in *Ways of Scope Taking* are inspired by the observation that noun phrases (NPs) do not all show a uniform scopal behavior, even when they would appear to have very similar semantics. For example, while *two movies* in (1a) can take wide scope over *every critic*, *at least two movies* in (1b) cannot:

(1) a. Every critic recommended two movies.

b. Every critic recommended at least two movies.

Similarly puzzling at first is the difference in the scopal behavior of *each* and *every* in (2). While *each student* easily licenses a pair-list reading for the question (and thus can be answered by e.g. (3a), *every student* does not (and thus can only be answered by e.g. (3b)):

(1) a. Who saw each student?

b. Who saw every student?

(1) a. Martin saw Sandra, Marta saw Carmen, and Teresa saw David.

b. Mark.

These sorts of asymmetries are more suprising, perhaps, than the more familiar contrasts between e.g. indefinite NPs and distributive universals because of the widespread assumption that *two* and *at least two*, and *every* and *each* denote the same quantifiers and also manifest similar, if perhaps not entirely identical, discourse anaphoric behavior.

Moreover, the interpretive rules for quantificational expressions which are familiar from generative linguistics and contemporary formal semantics (quantifying in, quantifier raising (QR), DRT construction rules, etc.) do not, by themselves, predict such asymmetries. In principle, such rules treat all NPs uniformly, or, at the most, divide them into two or three groups–for example, those, such as the indefinites, which are treated as open sentences in DRT or File Change Semantics (Kamp 1981, Heim 1982); those, such as the distributive universals, which introduce a “tripartite” quantificational structure in the same theories; and those, such as incorporated nominals, which contribute only descriptive content (see e.g. Van Geenhoven’s 1998 rule of semantic incoroporation). However, even in theories where such

distinctions are made, pairs like *two/at least two N* and *every/each N* have traditionally been classified as fundamentally the same, and any divergences in their scopal behavior dealt with using filters or conditions on QR or logico-syntactic representations (e.g. LFs).

What can be said about such differences? Are they simply idiosyncratic? The thesis developed in *Ways of Scope Taking* is that they are not, but rather reflect more finely grained semantic (and, relatedly, syntactic) characteristics of each type of expression. These characteristics define not just one classification of NPs (e.g. according to semantic type, as in DRT) but several. Thus, the conception of scope in terms of simple compositional dependency is replaced by (or augmented with) a series of more specific semantic characteristics which can be associated with scopally sensitive linguistic expressions. These characteristics are:

a) Discourse Reference: Whether or not the expression introduces a discourse referent or set of referents which can be the "subject(s) of a predication";

b) Boolean Operations: Whether the interpretation of an expression is sensitive to Boolean operations (e.g. by being undefined for one or more of them) or involves the calculation of them (see below for an example).

c) Variation: Whether or not the expression has an interpretation which can co-vary with that of another;

d) Distributivity: Whether the expression is capable of inducing co-variation between individuals in its domain and the denotation of some other element in the sentence; and

e) Maximality: Whether the truth of a sentence containing the expression crucially involves finding a maximal situation in which the satisfaction conditions for the sentence are satisfied.

The effects of these characteristics and their interactions are explored in *Ways of Scope Taking* with respect to various kinds of phenomena, including:

a) branching quantification (Beghelli, Ben-Shalom, and Szabolcsi's "Variation, Distributivity, and the Illusion of Branching" (29-69));

b) pair-list questions (Szabolcsi's "Quantifiers in Pair-List Readings" (311-47); Beghelli's "The Syntax of Distributivity and Pair-List Readings" (349-408); and Gutiérrez-Rexach's "Questions and Generalized Quantifiers" (409-52));

c) weak islands (Szabolcsi and Zwarts's "Weak Islands and an Algebraic Semantics for Scope Taking" (217-62));

d) event quantification (i.e. *4000 ships*-type sentences, Doetjes and Honcoop's "The Semantics of Event-Related Readings: A Case for Pair Quantification" (263-310)); and

e) the syntax of Hungarian, which is highly scope-sensitive (Szabolcsi's "Strategies for Scope Taking" (109-54), hereafter "Chapter 4").

Their properties are further examined in a computational model (Stabler's "Computing Quantifier Scope" (155-82)).

The most fundamental classification of NPs, discussed in various chapters but most notably in Szabolcsi's Chapter 4, distinguishes those which introduce a discourse referent capable of supporting predication from those which do not. The former category includes definites, indefinites, those with unmodified numerals such as *two N*–sometimes misleadingly called "bare indefinites"–, all of which introduce individual-type referents; and distributives such as *every/each N*, which are argued to introduce set-type referents. The latter category comprises NPs with modified numeral determiners such as *at least n N*, *at most n N*, *few N*, *between n and n N*, *exactly n N*, comparatives such as *more/less than n N*, and certain others in English. What is clearly novel here is the separate treatment of the modified numeral expressions. These NPs are argued to denote functions which perform a counting operation on the property denoted by the predicate with which they combine, rather than to provide a subject for predication; this semantics, in turn, is reflected among other ways in their inability to take inverse scope. Why should counting NPs be unable to take wide scope? The explanation adopted throughout the book is syntactic: the various authors who discuss such NPs adopt Beghelli and Stowell's theory of the syntax of scope, which simply assigns such expressions to a low-enough position at LF so as to ensure a narrowest-only interpretation. The syntax of Hungarian is argued to offer independent support for this proposal: Scope is read off of surface syntax in Hungarian, and counting NPs systematically occupy an immediately preverbal position which is lower than that of any other NP.

One aspect of this proposal which remains somewhat unsatisfying is that it does not make any clear connection between the obligatory narrow scope of counting NPs and their

failure to introduce a discourse referent for predication, since it is possible in principle for both wide and narrow scope expressions (such as narrow scope distributive universals) to introduce discourse referents. Why should the counting NPs be obligatorily interpreted *in situ*? The lack of an obvious answer to this question and the fact that the scopal behavior of counting NPs is identical to that of existential bare nominals (for which it would be rather less plausible to assign a "counting" function) suggest that there is more to this correlation. On the basis of various facts, including the ability of modifiers such as *at least* and *exactly* to attach to multiple syntactic categories, Krifka (to appear) argues that it is a mistake to consider expressions such as *at least n* as unitary determiners, just as it is standardly considered a mistake to treat *only n* (e.g. *only two*) as a unitary determiner. Rather, he argues, the modifier should be factored out and interpreted independently of the expression *n N*. As Krifka notes, this move opens up the possibility of interpreting the *n N* expression as "predicative" (or what I would call "property-denoting"). A similar, if more abstract, analysis could be extended to *few* and *no*, where the determiner is broken up into a clause-level negation feature and an indefinite, as in Ladusaw's (1992) analysis of negative concord expressions. If, in fact, the numeral expressions which *at least*, *at most*, etc. modify (and the indefinite parts of *few/no N*) turned out always to denote properties, we could connect their behavior to that of existential bare nominals, which have also been argued always to denote properties (see e.g. Van Geenhoven 1998). This connection would have two advantages: (1) we could straightforwardly relate the obligatory narrow scope of "counting" NPs and their failure to introduce discourse referents, since by their nature property-denoting expressions do not introduce discourse referents and always take scope *in situ*; and (2) we could perhaps better understand the restricted syntactic distribution of "counting" NPs, since property-type expressions like to stick close to the verb in many languages (again, see Van Geenhoven 1998 for details).

The role of Boolean operations in determining scopal possibilities is primarily discussed in Szabolcsi and Zwarts's chapter. They argue that weak island effects such as in (4) arise when one expression (typically, a wh-phrase) needs to take wide scope over some operator but cannot:

(4) ??How didn't the girls behave?

In earlier work, Szabolcsi and Zwarts began with the hypothesis that the monotonicity properties of the intervening operator (such as the negation in (4)) were directly responsible for the facts; however, on the basis of additional data they eventually conclude that the explanation lay not in monotonicity itself but rather in a correlated property: Which, if any, Boolean operations are necessarily involved in interpreting the intervening expression. For example, the presence of negation entails that calculating the answer to *Which girl didn't Mary see?* involves finding the set of girls Mary saw and taking its complement. But the fact that it is possible to do this calculation crucially follows from the fact that sets are closed under complements. Not all semantic structures are (a join semi-lattice, for instance, is not). Szabolcsi and Zwarts then hypothesize that, should the domain of a wh- or other expression which needs wide scope not be closed under complements, it should not be possible for it to extract from a negation, and indeed, they argue, this is what happens with *how* phrases and other negative-island-sensitive wh-expressions. Similar cases are discussed for the other Boolean operations (join and meet). The appeal to a property related to, but independent of, monotonicity is interesting because, in addition offering the hope of an improved account of the island facts, it clarifies why not all phenomena which appear at first to be sensitive to monotonicity are sensitive in exactly the same way: some facts may involve the Boolean properties of expressions; others may involve maximality (see below); still others may involve entirely different properties.

Let us now turn to the remaining semantic characteristics mentioned above. Variation is associated with narrow scope expressions: When an expression has narrow scope, it is possible to choose any of its witnesses [1] to support the truth of the quantificational case being evaluated. Clearly, then, variation is only possible when an expression has more than one possible witness set: singular definites and universals, for example, do not vary because they

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[1]A set W is a witness of a quantifier Q iff $W \mathrel{\rotatebox{90}{$\in$}} Q$ and W is a subset of the smallest set the Q lives on, where Q lives on a set A iff for all sets X, $X \mathrel{\rotatebox{90}{$\in$}} Q$ iff $(X \mathrel{\rotatebox{90}{$\subseteq$}} A) \mathrel{\rotatebox{90}{$\in$}} Q$. For example, a witness for *exactly one person* would be a set consisting of exactly one person.

have unique witnesses.[2] Distributive expressions are those which can induce variation. Interestingly, however, not all distributive expressions behave uniformly, leading to the hypothesis that there is more than one way to induce variation (see below). Maximality distinguishes monotone increasing expressions from nonincreasing expressions (such as *exactly one man* or *few men*). Nonincreasing expressions are special in that the truth of propositions containing them depends on their satisfaction conditions being met in the largest possible situation in the model or world of evaluation. For example, in a model in which two dogs bark, there are at least two nonmaximal situations which would support the truth of (5), in each of which exactly one dog barks.

(5) Exactly one dog barked.

In such a model, however, (5) is false–an expansion of one of the subsituations in which its conditions are satisfied which includes the second dog barking will falsify it. Thus, to be sure that (5) is true in the model, we must guarantee that it is true under any arbitrary expansion of the subsituation(s) in which it is true, i.e. in the maximal situation in the model.

Among the advantages of teasing apart the various semantic characteristics listed above, Beghelli, Ben-Shalom, and Szabolcsi argue that by considering the variation, distributivity and maximality properties of scopally-related expressions, we can predict when branching readings of such expressions are possible and, moreover, avoid the need to posit a separate semantic rule for branching; rather, they suggest, branching readings are always subcases of independently available scope asymmetric or cumulative readings. Another advantage becomes apparent in Beghelli and Stowell's chapter ("Distributivity and Negation: The Syntax of *Each* and *Every*" (71-107)) and in Beghelli's paper on pair-list readings. Both papers present data which show that not all distributive expressions behave alike–they

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[2]Unless, of course, the descriptive content of the expression can be sensibly indexed to another, variation-inducing expression, as is the case with *every fruit* on the most natural reading of *Every child ate every fruit* (i.e. that was on his/her plate). This is discussed in the chapter by Farkas in the volume.

distinguish so-called “strong distributors”, such as *each N*, which can among other things distribute over an expression like *different* (see (6a)), from “psuedo-distributors”, such as *two N*, which cannot ((6b)), even though they can distribute over other expressions ((6c)).

(6) a. Each student read a different book.

b. Two students read a different book. (“anaphoric” reading of *different* only)

c. Two students read two books.

Every represents a third case: it manifests strong distributive behavior on some occasions (e.g. with *different*) but not others (as in pair-list questions such as (2b))–a fact which I would have liked the authors to have related to *every*’s peculiar behavior in so-called amount relativization (Carlson 1977). The fact that distributive expressions differ in their ability to induce variation constitutes an obvious motive for teasing variation and distributivity apart.

A fundamental observation developed throughout *Ways of Scope Taking* is that the above-mentioned characteristics are associated with *construals* of expressions, rather than with the expressions themselves or even necessarily with the quantifiers they correspond to. Some NPs are claimed to have more than one kind of interpretation, and may thus manifest different characteristics on different occasions. A case in point are what Beghelli and Stowell refer to as “group-denoting QPs”, which include indefinites such as *some N* and *two N* (but not *at least two N*). Assuming a version of the Minimalist syntactic framework, they propose that such expressions are able to appear in various sytnactic positions at LF, including what they call Spec of RefP, in which case they are taken to introduce an individual discourse referent, and in their Case position, in which case they are interpreted as “counters”. Perhaps more surprisingly, NPs which denote the same quantifier may, for morphological or syntactic reasons, differ in their interpretive options. For example, Szabolcsi (Chapter 4:144) cites the following sort of contrast in the morphosyntactic expression of “more than six” in Hungarian (the exact examples have been constructed by me):

(6) a. Több, mint hat fiú emelte fel/fel-emelte az asztalt.

more than six boy lifted up the table

b. Hatnál több fiú emelte fel/??fel-emelte az asztalt.

six-than more boy lifted up the table

In (7a), the comparative is syntactic, whereas in (7b), it is morphologically expressed. This difference has consequences for the syntactic positions the expressions can occupy. The former can appear either in a wide scope position (what Szabolcsi calls HRrefP) or in an immediately preverbal, narrow scope position (what Szabolcsi calls PredOp), in which case it forces the verbal prefix *fel* to postpose. However, the latter is restricted to appearing in PredOp, as evidenced by the obligatory postposing of the verbal prefix. This difference, in turn, entails that while *több, mint hat fiú* has both a distributive and a collective reading, *hatnál több fiú* has only a collective reading. In sum, while determiner semantics will play a large role in determining an NP's semantic characteristics, it will not fully predict them, and certain amount of cross-linguistic variation and within-language specialization is to be expected. This important observation underscores the need for cross-linguistic work on scope and serves as a further reminder that the semantics of natural language expressions cannot be studied without taking their morphosyntactic behavior into account.

One last dimension to the complexity of scope is added in Farkas' "Evaluation Indices and Scope" (183-215). Farkas discusses data in which the scopal behavior of the descriptive content of an expression can be teased apart from that of the operator associated with that expression or with any variable associated with that expression. For example, the independence of descriptive content and operator is evident in examples such as (8):

(8) Mary thought that a witch claimed that every person in this room had contact with her.

It is perfectly possible to interpret the descriptive content of *every person in this room* outside the scope of Mary's thoughts or the witch's claims; however, the distributive operator contributed by every cannot take scope outside the clause in which it appears. The independence of descriptive content from the rest of an NP's semantics has become increasingly recognized in the past few years in the literature on intensionality (see e.g. Bonomi 1995); however, Farkas takes the further step of such facts to argue for the indexical approach to scope which she develops over syntactic approaches.

In addition to the generally high quality of its contributions, *Ways of Scope Taking* stands out as one of the most thematically coherent collected volumes I have ever come

across. One notable consequence of this is that the collective impact of the empirical and theoretical claims is somehow greater than that of each paper individually–whatever individual disagreements one might have with specific examples or with the analyses presented, it is impossible to deny the general patterns in the data, and one is left absolutely convinced of the book's thesis, namely that "the range of quantifiers that participate in a given process is suggestive of exactly what that process consists in" (p. xiii). Beyond the obvious interest the volume will inspire in those who work on scope, its thematic coherence and the fact that it offers an introductory chapter on the formal semantic notions used in it make *Ways of Scope Taking* an ideal volume around which to center an advanced course on scope phenomena. It presents a fresh and thought-provoking view of scope, illustrated with a wide variety of data. More importantly, it suggests new avenues for investigating scope phenomena in all their complexity.

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