The scope (non-)anomaly of determiner gapping

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McCawley (1993) notes a somewhat odd case of gapping, involving both the verb and the determiner:

(1) a. Too many Irish setters are named Kelly, and ___ German shepherds ___ Fritz.
   b. {No/Few/Hardly any} dog(s) eat(s) Whiskas or ___ cat(s) ___ Alpo.

A striking parallel between this determiner gapping and ordinary gapping is that they both exhibit a scope puzzle (Johnson, 2000). Note that (1b) (in which the negative quantifier scopes wide) is not synonymous to its non-gapped counterpart No dog eats Whiskas or no cat eats Alpo. This may appear rather anomalous, but a parallel scope mismatch is in fact found in ordinary Gapping as well (Siegel, 1984; Oehrle, 1987): (‡) Mrs. J can’t live in LA and Mr. J in Boston (⇒ ~[φ ∧ q]). Note that the scope anomaly in (1b) poses an even greater challenge to most approaches to gapping (especially, deletion-based ones) than the already highly problematic (‡). Here, the restriction (cat) and (part of) the scope (Alpo) of the quantifier appear together in the second conjunct without the quantifier no. But the restriction and (part of) the scope alone cannot directly combine to yield any meaningful expression compositionally.

Johnson (2000) sketches an analysis which attempts to meet both of these challenges (i.e., the scope anomaly and the compositionality problem) at once. Adopting the split scope analysis of negative quantifiers in which no is decomposed into higher negation and lower indefinite at LF, he proposes to analyze the scope anomaly in determiner gapping in terms of a non-ATB movement of the covert indefinite from the first conjunct along the following lines:

(2) [AgP [NEG [φA dog]], j] [TP t1 t2 [TP j eat, [VP [t1 t2 Whiskas] or [φA cat t2 Alpo]]]]

The verb first moves from V to T across the board. The subject of the first conjunct φA dog then moves from its VP internal position to Spec,TP to attach to NEG (which is base-generated there to reflect its scope). This NEG+φA dog further moves to Spec,Agr (the surface subject position). NEG+φA fuse to be realized as no at PF, while at LF, φA dog reconstructs to its base position.

While this analysis successfully mediates the scope anomaly, the non-ATB movement of the first conjunct subject creates a spurious surface VP (or TP) asymmetrically containing the subject of the second conjunct. Thus, in (‡) No positron can occupy the inner shell and electron {a. ⋄/b. sit in} the outer shell of the same atom, the subject moves to Spec,Agr (in whose head sits the auxiliary), and the verb remains in either the T (in (‡a)) or V (in (‡b)) head below:

(3) a. [AgP No positron, [AgP can [TP occupy j [VP [t1 t2 the inner shell] and [VP φA electron t2 the outer shell]]]]
   b. [AgP No positron, [AgP can [TP [VP t1 occupy the inner shell] and [VP φA electron sit in the outer shell]]]

But neither the TP nor the VP exhibits the typical properties of complements of auxiliaries:

(4) a. No positron can [TP, occupy the inner shell and electron the outer shell of the same atom]. #Not only that, no neutron can [TP, occupy the inner shell and electron the outer shell of the same atom].
   (VP ellipsis)
   b. No positron can [VP, occupy the inner shell and electron sit in the outer shell of the same atom]. #Not only that, no neutron can [VP, occupy the inner shell and electron sit in the outer shell of the same atom].

(5) a. *[TP, Occupy the inner shell and electron the outer shell of the same atom], no positron can t1.
   (fronting)
   b. *[VP, Occupy the inner shell and electron sit in the outer shell of the same atom], no positron can t1.

If phenomena like VP ellipsis and fronting target TPs, the unacceptability of (4a)/(5a) remains unaccounted for; if they target VPs, (4b)/(5b) turn out to be problematic. Thus, either way, the analysis fails. Johnson’s analysis is primarily motivated by semantic considerations. But the above data strongly suggests that it mischaracterizes the syntax of determiner gapping. The misprediction is essentially due to the fact that it analyzes determiner gapping via coordination at the VP level.

We argue, contra Johnson, that determiner gapping involves coordination at the S level, but that what gets coordinated are two sentences missing the verb and the determiner. Kubota and Levine (2012) show that such an analysis is possible for ordinary gapping in a variant of categorial grammar involving an order-insensitive slash | tied to λ-binding in the phonological component in addition to the familiar directional slashes. (Theoretically, | corresponds to the implication connective in intuitionistic linear logic, and its independent empirical motivation comes from analyses of quantification and extraction (Oehrle, 1994; Muskens, 2003).) In this approach, a sentence missing a TV (= (NP\S)/NP for transitive verbs) in the middle can be characterized via hypothetical reasoning as a discontinuous constituent with a functional phonology of type st → st (with st the type for strings):
where the lambda-bound variable \( \varphi \) in phonology keeps track of the position of the TV-type gap. Such S[TV] categories are directly coordinated by a Gapping specific conjunction of type \( (S[TV])[(S[TV])|(S[TV])] \):

\[
\lambda \varphi. \text{robin} \circ \varphi \circ \text{bill}; P(\text{b})(r); S[TV] \quad \mathcal{E}
\]

This Gapping-type conjunction instantiates standard generalized conjunction for syntax and semantics, but the surface asymmetry of the two conjuncts of Gapping is directly encoded in the phonological specification: as in (7), the first conjunct’s gap is inherited to the larger coordinated expression, but the corresponding second conjunct’s gap is filled in with the empty string \( \varepsilon \).

In this like-category coordination analysis of Gapping with \( \mid \), what gets gapped appears in a higher position than the coordinate structure in the combinatoric syntax. Kubota and Levine (2012) show that this immediately predicts the wide scope auxiliary in examples like (\( \dagger \)).

To extend this analysis to the wide-scoping negative quantifiers in determiner gapping, we adopt a novel, lexical treatment of split scope in which negative quantifiers are treated as lexically type-raised quantifiers of type \( S[(S[Det])] \) (with Det the type of ordinary quantifiers), with the semantics:

\[
(8) \quad [\text{no}] = \lambda \mathcal{F}_\{(et, \{et, t\}, t) \}, \neg \mathcal{F}(\exists)
\]

That is, no takes a sentence missing a quantificational determiner (of type \( \{et, \{et, t\}\} \)), and fills in a positive quantifier meaning to that determiner gap position, and sentential negation scopes over the resultant proposition \( \mathcal{F}(\exists) \). This is essentially a lexical treatment of ‘split scope’, made possible by a lexically type-raised higher order type assignment to the negative quantifier. (Other quantifiers (like those in (1a)) have non-type-raised, ordinary GQ type, thus not exhibiting the sort of scope anomaly found with negative quantifiers in (1b).)

Determiner gapping can then be treated as a conjunction of type \( S[Det][TV] \) categories, which, via hypothetical reasoning, is assigned the following type of meaning compositionally:

\[
(9) \quad \lambda Q(\text{et,et}) \lambda \mathcal{P}(\{et, \{et, t\}\}). \mathcal{P}(\text{dog}) (\lambda x. Q(w)(x))
\]

Such type \( S[Det][TV] \) expressions are then coordinated via generalized conjunction, with which the verb combines to fill in the \( Q \) variable above, yielding a type \( S[Det] \) expression. This is then given as an argument to the negative determiner to yield the following interpretation for the whole sentence:

\[
(10) \quad \neg [\exists \text{dog} (\lambda x. \text{eat}(w)(x)) \lor \exists \text{eat} (\lambda x. \text{eat}(a)(x))]
\]

Crucially, since the negative determiner scopes over the whole coordinated gapped sentence in the combinatoric structure, the negation wide scope reading is correctly obtained. The analysis moreover avoids the problem of Johnson’s analysis, since there is no VP constituent containing the subject of the second clause at any level of representation or any point in the derivation. Note also that the present proposal extends naturally to more complex examples like No dog’s taste favors Alpo, or cat’s ___ Whiskas, which, under the present view, is merely a case in which the head noun of a possessive NP is gapped together with the determiner and the verb.

To summarize, the analysis we have proposed predicts the wide scope of negative quantifiers in determiner gapping as a direct consequence of its gapped status. In a movement-based setup, mediating the highly complex form-meaning mismatch exhibited by determiner gapping seems to inevitably produce spurious syntactic nodes of the sort found in Johnson’s analysis. Though hypothetical reasoning-based treatments of linguistic phenomena are often thought to be largely equivalent to movement-based treatments in empirical coverage, the success of the former as opposed to the failure of the latter here seems to speak for an empirical advantage of the former over the latter.

References