Surface scope and inverse linking

Klaus Abels, UCL

Multiply quantified structures generally allow the surface scope reading (with some well-motivated exceptions, see e.g. Büring 1997). Non-surface readings are often disallowed altogether. Even when non-surface readings are allowed, they are frequently more difficult to access than the surface scope readings or, as in the case of indefinites, can be produced without a syntactic scoping mechanism (e.g. Schwarzschild 2002). Abels 2024 uses the fact that both Mandarin and Vietnamese allow ditransitive verbs with V IO DO and V DO IO order and observes that in both languages and independently of the order of objects universally quantified indirect objects can take scope over existential direct objects while universally quantified direct objects cannot take scope over existential indirect objects (see also Gan and Tsai 2020). When the broad-strokes characterization of scope is applied to ditransitive VPs in these languages, we can derive support for Janke and Neeleman's 2012 theory of ditransitive VPs: V IO DO structures are rightward descending while V DO IO structures are rightward ascending. Abels 2024 offers further independent support from a variety of languages.

(1) a. [V [IO [t_V DO]]]
b. [[V DO] IO]

Why should the scope of objects be a reliable diagnostic for structure in this case? Under the mainstream approach to quantifier interpretation (Heim and Kratzer 1998) quantified object DPs obligatorily undergo quantifier raising. Therefore scope is a constituency diagnostic only under the ancillary assumption that QR preserves c-command (Bruening 2001; Huang 1982).

Here, I explore the prospects of an in-situ approach to object quantifiers building on Keenan 2012, 2016. Keenan proposes that instead of treating quantifiers as functions from (one-ary) predicates (<et>) to truth values (0-ary predicates), we generalise their type so that they are functions from the set of n+1-ary predicates mapping each such predicate to a particular n-ary predicate. This schema includes the basic case <<et> t> but generalizes to <<<e <et>><et>>, <<e<e<et>>><e<et>>>, etc. The key insight is that this function can be defined semantically in terms of the undisputed denotation of the quantifier for the <<et>t> case. Let F be a function from n+1 individuals to a truth value and let let Q be a quantifier with the basic denotation B in <<et> t>, then Q(F) is that function G from n individuals to a truth value such that G(a_1....a_n) is true iff B(λ x F(x, a_1,... a_n)) is true. This schema does not require quantifier raising for type reasons and derives surface scope for multiple quantifiers.

One of the most influential arguments for covert quantifier raising comes from inverse linking structure of the type in (2) (May 1977; May and Bale 2006):

(2) Someone from every city despises it.

Here 'every city' preferentially takes wide scope and binds the pronoun 'it'. If binding requires scope and c-command, this is a powerful argument for a (non-surface) representation of this sentence in which 'every city' c-commands 'it.' On standard assumptions, such movement is required by type considerations anyway (though see Heim and Kratzer 1998). However, DP-internal scope of the universal is possible, (3).

(3) One apple on every plate is too much.

The DP-internal scope is troubling for the type-driven approach but falls out from Keenan's theory.

Moreover, the surface position of the PP containing the quantifier plays an important part in the availability of inverse linking (Thoms 2023; Zimmermann 2001. The data suggest that

inverse linking requires the PP containing the quantifier to be rightward extraposed within DP to a position above the main quantifier, (6).

(4) a. One person with good manners from every province was invited. $\forall \gg \exists$
b. One person from every province with good manners was invited. $*\forall \gg \exists$

(5) a. I saw a picture by Warhol of every Factory regular. $\forall \gg \exists$
b. I saw a picture of every Factory regular by Warhol. $*\forall \gg \exists$

(6) [[One|a [N PP]] [P every N]]

This conclusion is already strongly suggested by data from Huang 1982, chapter 4, who showed that the overt position of the embedded quantifier in Mandarin (to the left or the right of the main quantifier) is crucial in turning inverse linking readings on and off. The idea that QR can separate the container DP from the contained DP in inverse linking is also called into question by Larson's generalization (Larson 1985), according to which the container DP and the contained DP take uninterrupted relative scope.

I build up an account of these facts in two steps. First I generalize Keenan's denotation for quantifying from n+1-ary predicates to all types <eτ>, where τ is a type ending in <t>. Quantifiers are functions from <eτ> to τ (<<eτ>τ>): Let F be a function from an individual (D_e) and n arbitrary arguments to a truth value (<e τ>, τ a type ending in <t>) and let Q be a quantifier with the basic denotation B in <<et> t>, then Q(F) is that function G from n arguments to a truth value such that $G(a_1....a_n)$ is true iff $B(\lambda$ x $F(x, a_1,...a_n))$ is true. This further generalization of the notion of a predicate allows structures of the kind in (7) to be interpreted. It directly explains why the surface position of the quantifier (above or below the determiner of the container DP, see (4–5) above) matters, how binding in inverse linking structures works (note that position of the λ-abstractor), and why Larson's generalization holds. However, there is still an open question about the position of the preposition, as we would like to interpret (8) rather than (7).

(7) [[[λx [one person from t_x with good manners]] [every city]] was invited]

(8) [[$_{DP_3}$ [$_{DP_2}$ λ $f_{D_{<et>}}$ [$_{DP_1}$ one person t_f with good manners]] [$_{PP}$ from [every city]]] [$_{I'}$ was invited]]

This can be achieved with the type-shift described in Steedman, 2011, p. 80. The type-shift itself is semantically inert but has the effect that the PP can take DP_2 as its argument returning the same semantic type as DP_1 to DP_3, a kind of Chomsky-adjunction in the semantic realm. Given this typeshift, the preposition will need to be of type <e <<<et> <<et>t>><<et>t>>> in (8). This has the form <e τ> (τ a type ending in <t>). Given what we said about quantifiers above, this correctly allows the quantifier to take scope over P, DP_2, and I'.

We thus explain why quantifier scope can be a useful diagnostic for scope among co-arguments and why it fails to be such a diagnostic in inverse linking structures. QR might still be useful but only for scope shifting operations.

References

Abels, Klaus (Apr. 2024). *Scope and the structure of ditransitive VPs in SVO languages*. Ms UCL.

Bruening, Benjamin (2001). "QR obeys superiority: frozen scope and ACD." In: *Linguistic Inquiry* 32.2, pp. 233–273.

Büring, Daniel (1997). "The great scope inversion conspiracy." In: *Linguistics and Philosophy* 20.2, pp. 175–194.

Gan, Tian and C.-Y. Edwin Tsai (2020). "The syntax of Mandarin dative alternation: An argument from quantifier scope interpretation." In: *International Journal of Chinese Linguistics* 7.2, pp. 187–222. DOI: doi.org/10.1075/ijchl.20006.gan.

Heim, Irene and Angelika Kratzer (1998). *Semantics in generative grammar*. Malden, MA.: Blackwell Publishers.

Huang, C.-T. James (1982). "Logical relations in Chinese and the theory of grammar." PhD thesis. MIT.

Janke, Victoria and Ad Neeleman (2012). "Ascending and Descending VPs in English." In: *Linguistic Inquiry* 43.2, pp. 151–190.

Keenan, Edward L (2012). "*In situ* interpretation without Type Mismatches." In: *UCLA Working Papers in Linguistics* 16, pp. 94–110.

— (2016). "*In situ* interpretation without Type Mismatches." In: *Journal of Semantics* 33, pp. 87–106.

Larson, Richard K (1985). *Quantifying into NP*. Ms MIT.

May, Robert (1977). "The grammar of quantification." PhD thesis. MIT.

May, Robert and Alan Bale (2006). "Inverse Linking." In: *The Blackwell Companion to Syntax*. Ed. by Martin Everaert and Henk van Riemsdijk. Malden, MA: Blackwell Publishers. Chap. 36, pp. 639–667.

Schwarzschild, Roger (2002). "Singleton Indefinites." In: *Journal of Semantics* 19.3, pp. 289–314.

Steedman, Mark (2011). *Taking scope*. Cambridge, Mass: MIT Press.

Thoms, Gary (2023). "Inverse Linking and Extraposition." In: *Linguistic Inquiry*. DOI: doi.org/10.1162/ling_a_00488.

Zimmermann, Malte (2001). "Inverse Linking without LF-Movement." In: *Proceedings of WECOL*.