Against the division of labor in scope and binding

Hamblin (*Foundations of Language* 1973) treats questions with alternative sets, computed compositionally. Reinhart (*Linguistics and Philosophy* 1997) treats indefinites with choice functions. These innovations figure in many linguistic analyses as semantic scope mechanisms separate from syntactic scope (like quantifier raising) for "genuine" quantifiers (like *most*). This division of labor correctly predicts that scope constraints differ between genuine and non-genuine quantifiers, but I present arguments from binding that scope must be entirely semantic or entirely syntactic.

Variables are essential for quantifier raising but incompatible with alternatives, so all existing accounts fail for binding alongside alternatives. The problem afflicts any application of alternatives with assignment functions, but I illustrate it here on Kratzer and Shimoyama's implementation for in-situ *wh*-phrases (*Tokyo Conference on Psycholinguistics* 2002). Hamblin takes a *wh*-constituent to denote a set of alternatives. A *wh*-NP denotation maps assignments to individual-sets, and a *wh*-clause denotation maps assignments to proposition-sets (answer-sets). To combine alternatives, Kratzer and Shimoyama change the Function Application rule:

(1) If α is a branching node whose daughters are β and γ, where $[\![\beta]\!]$ has the type $\langle g, \langle\langle\tau,\sigma\rangle, t\rangle\rangle$ and $[\![\gamma]\!]$ has the type $\langle g, \langle\tau, t\rangle\rangle$, then $[\![\alpha]\!]$, of type $\langle g, \langle\sigma, t\rangle\rangle$, is defined by

$$[\![\alpha]\!](g) = \{\, f(x) \mid f \in [\![\beta]\!](g) \wedge x \in [\![\gamma]\!](g) \,\}.$$

The type g contains assignments—functions from indices to individuals.

In (2), the embedded clause contains both an in-situ *wh*-phrase and a pronoun bound from outside. I consider the simpler question (3) instead, pretending that *who* there is an in-situ *wh*-phrase.

(2) Who told every boy$_i$ that [who saw him$_i$]?

(3) Who saw nothing$_i$?

Kratzer and Shimoyama assume that the quantifier *nothing* raises, triggering Predicate Abstraction for alternatives:

(4) If α is a branching node whose daughters are an index i and β, where $[\![\beta]\!]$ has the type $\langle g, \langle\sigma, t\rangle\rangle$, then $[\![\alpha]\!]$ has the type $\langle g, \langle\langle e,\sigma\rangle, t\rangle\rangle$ and is defined by

$$[\![\alpha]\!](g) = \{\, f \in D_{\langle e,\sigma\rangle} \mid \forall a \in D_e.\, f(a) \in [\![\beta]\!](g[a/i]) \,\}.$$

The rules (1) and (4) yield the denotation $\lambda g.\, \{\, \neg\exists a \in D_e.\, `f(a) \text{ saw } a' \mid f \in D_{\langle e,e\rangle} \,\}$ for (3), which predicts a quasi-functional reading under which the answers (5) and (6) should be felicitous—but they are not.

(5) *Its$_i$ owner saw nothing$_i$.

(6) #Xavier didn't see the apple; Yves didn't see the banana; ...

For (2–3), we want Predicate Abstraction to produce a set of functions, not a function to sets as in (4). In general, we need to interpose sets and functions. For example, (7) calls for functions to sets of functions.

(7) Which man$_i$ told nobody$_j$ about which of his$_i$ paintings?

The standard theory of binding using assignments cannot accommodate such interposing, but variable-free binding (Jacobson *Linguistics and Philosophy* 1999) provides the needed flexibility: I replace functions with relations throughout Barker's integration (*Linguistics and Philosophy* in press) of variable-free semantics with Hendriks's Flexible Types for quantification (dissertation 1993). Variable-free accounts of phenomena like crossover carry over to rule out sentences like (8).

(8) *Which of his$_i$ paintings reminded nobody$_j$ of which man$_i$?

Choice functions do not predict such binding constraints—only an integrated theory can.