The scope of alternatives

Overview. Point-wise functional application ('PFA') is commonly used to build grammars that countenance alternative-inducing expressions (e.g. *wh*-phrases, focused phrases, indefinite pronouns, disjunctions). If X denotes a set of things of type α, and Y a set of functions of type $\alpha \to \beta$, PFA says that $[\![X\ Y]\!]^g$ is given by $\{f\ x \mid x \in [\![X]\!]^g \wedge f \in [\![Y]\!]^g\}$ (cf. e.g. Hamblin 1973, Rooth 1985, Kratzer & Shimoyama 2002, Alonso-Ovalle 2006). This talk motivates a different picture, one in which alternatives *take scope*. I'll demonstrate that this can be accomplished by decomposing Partee's (1986) LIFT into two freely applying type-shifters, and argue that this approach improves on PFA in several respects.

The proposal, in brief. Semanticists frequently assume a freely available LIFT operation, such that LIFT $a = \lambda c.\, c\, a$ (e.g. Partee 1986, Hendriks 1993, Barker 2002). My proposal is to manage alternatives—without PFA—by decomposing LIFT into **two** operations, namely those in (1). On the left, $\boxed{\cdot}$ maps any a into a singleton set containing only a; if a is type α, $\boxed{a}$ is type $\{\alpha\}$ (where '$\{\alpha\}$' abbreviates '$\alpha \to t$'). On the right, $\uparrow$ turns any set m into a scope-taker by feeding each a in m to a scope argument c and collecting the results; if m is type $\{\alpha\}$, $m^\uparrow$ is type $(\alpha \to \{\beta\}) \to \{\beta\}$, for some β. Notice that for any a, $\boxed{a}^\uparrow =$ LIFT $a = \lambda c.\, c\, a$.

$$\boxed{a} := \{a\} \qquad\qquad m^\uparrow := \lambda c. \bigcup_{a \in m} c\, a \tag{1}$$

For a basic case such as *someone left*, this setup easily derives the same result as PFA, namely $\{\mathsf{left}\, x \mid \mathsf{person}\, x\}$ (presupposing familiarity with how PFA secures this result). See (2), where I record the object-language application of our two shifters with homonymous decorations at LF. Though we assume *someone* denotes the set of persons, nothing else diverges from the basic setup in Heim & Kratzer 1998. For instance, $[\![\text{left}]\!]^g$ is the familiar $e \to t$ function, and binary-branching nodes are interpreted by Functional Application or Predicate Abstraction.

$$[\![\text{someone}^\uparrow\ [1\ \boxed{t_1 \text{ left}}\,]]\!]^g = \{x \mid \mathsf{person}\, x\}^\uparrow\, (\lambda y.\, \boxed{\mathsf{left}\, y}\,) = \{\mathsf{left}\, x \mid \mathsf{person}\, x\} \tag{2}$$

We may extract a familiar truth-condition from (2) via a categorematic closure operation $\exists := \lambda \mathcal{S}.\, \mathsf{True} \in \mathcal{S}$ (cf. Kratzer & Shimoyama's 2002: 7 importantly syncategorematic version).

Some benefits. I'll illustrate some of the theory's advantages with an alternatives-based analysis of English indefinites. I discuss other sorts of alternative generators on the next page.

ABSTRACTION. Shan (2004) has pointed out that a tenable abstraction operation is not available to PFA-style grammars (this issue was noticed as early as Rooth 1985: 46–59). PFA abstraction works as in (3) (cf. Poesio 1996: 35, Hagstrom 1998: 153, Kratzer & Shimoyama 2002: 8).

$$[\![6\ [t_6 \text{ read a paper}]]\!]^g_{\text{PFA}} = \{f \mid \forall x.\, f\, x \in \{\mathsf{read}\, y\, x \mid \mathsf{paper}\, y\}\} \tag{3}$$

The problem with this sort of rule: there are too many functions in the derived set. Combining (3) with e.g. $\{\mathsf{nobody}\}$ via PFA problematically yields a set of propositions with a true member iff nobody read *every* paper (e.g., a possible value for f is the function mapping each x to the proposition that x read y, with y some paper x *didn't* read; clearly, nobody f's!). Jettisoning PFA in favor of the scopal approach to alternatives management dissolves this issue.

EXCEPTIONAL SCOPE. One of PFA's main uses is as a back-channel pseudo-scope mechanism for alternatives that allows them to escape scope islands. Though the proposed account manages alternatives via scope and not pseudo-scope, it nevertheless predicts that alternatives can expand outside of a scope island. An analysis of the *some* > *if* reading of Reinhart's (1997) classic *if some relative of mine dies, I'll inherit a house* is given in (4). The antecedent denotes a set of propositions $\{\mathsf{dies}\, x \mid \mathsf{relative}\, x\}$—derived along the same lines as (2)—which itself shifts into a scope-taker via $\uparrow$ and takes scope over the conditional. The upshot is as if the indefinite has itself acquired scope over the conditional, even as it is interpreted inside its minimal tensed clause.

$$\{\text{dies } x \mid \text{relative } x\}^{\uparrow} \left(\lambda p.\, \boxed{\text{if } p \text{ house!}}\right) = \{\text{if (dies } x\text{) house!} \mid \text{relative } x\} \tag{4}$$

It is worth (re-)emphasizing that our theory can only derive wide-scope readings of this sort via a bona fide scope mechanism. Thus, we correctly predict that an indefinite cannot scope over an operator that binds into its restrictor (as in Schwarz's 2002 *no*^{i} *candidate submitted a paper he*$_i$ *wrote*). This contrasts with pseudo-scope theories of indefinites (e.g. Reinhart 1997) and proposed fixes of the aforementioned Abstraction issue (Romero & Novel 2011).

Selectivity. Alternative percolation out of islands can be selective: *if a persuasive lawyer visits a relative of mine, I'll inherit a house* readily admits an any-old-lawyer, one-rich-relative reading. The theory allows for this. The following *higher-order* denotation for the antecedent can be derived from an LF with two ↑ shifts, two instances of QR, and two applications of $\boxed{\cdot}$:

$$\text{a.rel}^{\uparrow} \left(\lambda x.\, \boxed{\text{a.lawyer}^{\uparrow} \left(\lambda y.\, \boxed{\text{visits } x\, y}\right)}\right) = \{\{\text{visits } x\, y \mid \text{lawyer } y\} \mid \text{rel } x\} \tag{5}$$

Call this meaning \$. The relevant reading of the conditional is given by $\$^{\uparrow}\left(\lambda \mathcal{S}.\, \boxed{\text{if } (\exists\, \mathcal{S}) \text{ house!}}\right)$. Given a relative x, the first-order alternative set $\{\text{visits } x\, y \mid \text{lawyer } y\}$ "reconstructs" to within the scope of the conditional, where ∃ existentially discharges the reconstructed alternatives.

Extensions. The analysis can be extended to other phenomena which implicate alternatives. Higher-order alternatives can be used to explain the potential for selectivity in association with focus (Rooth 1996, Wold 1996), and are likewise consonant with arguments that *wh* quantification sometimes leads to higher-order alternative sets (e.g. Dayal 1996, 2002, Fox 2012). In addition, the proposed account of alternative expansion outside islands represents a new take on LF pied-piping (e.g. Nishigauchi 1990, von Stechow 1996, Dayal 1996, Sternefeld 2001) and can be leveraged into a general account of both overt and covert pied-piping.

The basic strategy is quite general. For example, while the proposal does not immediately allow for the widest-scope-indefinite reading of *every*^{i} *boy said his*$_i$ *mother met a famous phonologist* (since QRing the scope island above *every boy* unbinds the pronoun), simply moving assignment functions into the model à la Sternefeld 1998 fixes the problem by allowing the "reconstructed" meaning in higher-order cases parallel to (5) to undergo *binding* reconstruction, as well. See the left-hand side of (6). From there, it's a short leap to a *dynamic* semantics, where we allow for meanings which update assignment functions, and where the alternatives associated with indefinites encode nondeterministic assignment updates (e.g. Barwise 1987, Groenendijk & Stokhof 1991, Dekker 1993). See the right-hand side of (6).

$$\begin{array}{ll} \boxed{a} := \lambda g.\, \{a\} & \boxed{a} := \lambda g.\, \{\langle a, g\rangle\} \\ m^{\uparrow} := \lambda c.\, \lambda g. \bigcup\limits_{a \in m\, g} c\, a\, g & m^{\uparrow} := \lambda c.\, \lambda g. \bigcup\limits_{\langle a, h\rangle \in m\, g} c\, a\, h \end{array} \tag{6}$$

In any of these cases, the basic account of Abstraction, Exceptional scope, and Selectivity remains the same. The different approaches simply implicate different decompositions of lift (and, of course, some different lexical entries for indefinites).

Selected references. **Dayal, V**: 1996, *Locality in wh quantification*; 2002, *LI*. **Dekker, P**: 1993, PhD diss. **Hamblin, C. L.**: 1973, "Questions in Montague English". **Kratzer & Shimoyama**: 2002, "Indeterminate pronouns". **Nishigauchi, T**: 1990, *Quantification in the theory of grammar*. **Partee, B**: 1986, "NP interpretation and type-shifting". **Reinhart, T**: 1997, *L&P*. **Romero, M. & M. Novel**: 2011, "Variable Binding and Sets of Alternatives". **Rooth, M**: 1985, PhD diss. **Schwarz, B**: 2002, "Two kind of long-distance indefinites". **Shan, C-c**: 2004, "Binding alongside Hamblin alternatives". **von Stechow, A**: 1996, *NLS*. **Sternefeld, W**: 1998, "Reconstruction and connectivity"; 2001, "Partial movement constructions". **Wold, D**: 1996, "Long distance selective binding".