Questions: Semantic and Computational Issues

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1. Quantification and binding in functional questions

Goal puzzle:

(1) a. Who is every Englishman's best friend? His mother.
b.#Who is his best friend? His mother.

(2) a. Every Englishman's best friend is his mother.
b.#His best friend is his mother.

(3) a. The woman that every Englishman loves is his mother.
b.#The woman that he loves is his mother.

Specificational copula ("is") seems to equate some functions (such as the function that maps every Englishman to his best friend) but not others (such as the mother function). Perhaps functions can only be equated given a restricted domain: all Englishmen in this possible world, not just all individuals in any possible world.

2. Chierchia 1993: "Questions and quantifiers interact in complex ways"

Mainly consider the interaction between a singular *wh*-phrase and a quantifier.

	Weak crossover	Quantifier kind	
		every, two	*no, at most two*
Single answer	✓	✓	✓
Functional answer	*	✓	✓
Pair-list answer	*	✓	*

Weak crossover

(4) a. Which woman does every/no Englishman love?
b. Which woman loves every/no Englishman? (single answer only)

(5) a. Which dish did every student bring?
b. Which student brought every dish? (single answer only)

The meaning of functional questions

(6) Which woman does every Englishman$_j$ love t_i^j?
$\lambda p.\, \exists f_{\langle e,e\rangle}.\, \big[\forall x.\, [\text{woman}(f(x))] \wedge p = \hat{}\forall x.\, [\text{Englishman}(x) \Rightarrow \text{love}(x, f(x))]\big]$
Domain: Englishmen. Range: women.

Quantifier kind

(7) a. Which woman does no Italian married man like?
b. His mother-in-law
c. *Giovanni, Maria; Paolo, Francesca; ...

(8) a. Which requirement do at most three students like?
b. Their exotic language requirement
c. *Paul the semantics requirement, Mary the phonology requirement, (and Bill the exotic language requirement)

Minimal witness set (required for pair-list questions)

(9) A minimal witness set for a quantifier $\mathscr{P}$ is a set A such that $A \in \mathscr{P}$ and for no $B \subseteq A$, $B \in \mathscr{P}$. (Notation: $W(\mathscr{P}, A)$)

Intuition: first pick two people, then tell me which book each of them likes.

"Each quantifier has one or more minimal witness sets"!?

Two ways to assign denotations to questions

(10) Which book do two people like?

(11) A set of simple questions
$\lambda Q.\, \exists A.\, \big[W(\text{two people}, A) \wedge Q = \lambda p.\, \exists x y.\, [A(x) \wedge \text{book}(y) \wedge p = \hat{}(x \text{ likes } y)]\big]$
(here Q is a simple question)

(12) A lifted simple question (a generalized quantifier over simple questions)
$\lambda P.\, \exists A.\, \big[W(\text{two people}, A) \wedge P\big(\lambda p.\, \exists x y.\, [A(x) \wedge \text{book}(y) \wedge p = \hat{}(x \text{ likes } y)]\big)\big]$
(here P is a set of simple questions)

The meaning of pair-list questions

(13) Which book$_i$ do two people$_j$ like t_i^j?

(14) which book$_i$ + two people$_j$ + t_j likes t_i^j $\quad \rightarrow$ Absorption $\rightarrow$

$\lambda P.\, \exists A.\, \big[W(\text{two people}, A)$
$\wedge\, P\big(\lambda p.\, \exists x f.\, [A(x) \wedge \forall x.\, [A(x) \Rightarrow \text{book}(f(x))] \wedge p = \hat{}(x \text{ likes } f(x))]\big)\big]$

"we might as well [quantify over Skolem functions]" (cf. May's Scope Principle)

Binding

(15) (I want to know) to whom$_i$ [every student$_j$ gave two of his$_j$ papers$_k$ ~~to~~ $t_i^{j,k}$]

(16) to whom$_i$ + every student$_j$, two of his$_j$ papers$_k$ + t_i gave t_j to $t_i^{j,k}$