New Perspectives on Concealed Questions

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Outline

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Basic Data I

Definite CQs

(1) John knows the capital of Italy.

Indefinite CQs

(2) John knows a doctor who could help you. (Frana 2006)

Quantified CQs

(3) John knows every telephone number. (Heim 1979)

Pair-list reading:
John knows that Paul's number is 5403, Katrin's number is 5431, . . .

Set reading:
John knows of every phone numbers that it is a phone number.

Basic Data II: CQ-containing CQs (CCQs)

Definite CCQs (aka Heim's Ambiguity)

(4) John knows the capital that Fred knows. (Heim 1979)

Reading A: John and Fred know the same capital, say, the capital of Italy.

Reading B: John knows which capital Fred knows.

Indefinite CCQs

(5) John knows a doctor that Fred knows.

Quantified CCQs

(6) John knows every capital that Fred knows.

Basic Data II: CQ-containing CQs (CCQs)

Four readings

(6) John knows every capital that Fred knows.

Reading A:

- Pair-list: for every country such that Fred knows its capital, John also knows its capital;
- Set: for every capital of which Fred knows that it is a capital, John also knows that it is a capital;

Reading B:

- Pair-list: for every country such that Fred knows its capital, John knows that it is a country such that Fred knows its capital;
- Set: for every capital of which Fred knows that it is a capital, John knows that it is a capital such that Fred knows it is a capital.

Approaches

	[-P]	[+P]
Questions / Propositions	Romero, 2007 Nathan, 2006	**Aloni 2007** **Roelofsen & Aloni 2008**
Properties	Frana, 2006	Schwager, 2007
Individual concepts	Romero, 2005	Schwager, 2007

Main features of our proposals

- CQs denote question extensions, i.e. propositions;
- Their interpretation depends on the particular perspective that is taken on the individuals in the domain.

Arguments along the TYPE dimension

Coordination

(7) They revealed the winner of the contest and that the President of the association would hand out the prize in person.

(8) I only knew the capital of Italy and who won the World Series in 1981.

Parsimony

We'd rather not assume a special purpose lexical item KNOW_{CQ} besides KNOW_{ACQ} and KNOW_{EPI}.

Groenendijk & Stokhof on questions and knowledge

Questions

Questions denote their true exhaustive answers:

(9) a. What is the capital of Italy?
b. $?x.\ x = \iota x.\textsc{capital-of-italy}(x)$
c. $\lambda w.[\![\iota x.\textsc{capital-of-italy}(x)]\!]_w = [\![\iota x.\textsc{capital-of-italy}(x)]\!]_{w_0}$
d. λw. Rome is the capital of Italy in w

Knowledge

J knows$_{\textsc{epi}}$ α iff J believes the denotation/extension of α

(10) John knows what is the capital of Italy and that it is a very old city.

(11) John knows what is the capital of Italy & Rome is the capital of Italy
$\Rightarrow$ John knows that Rome is the capital of Italy.

Arguments along the PERSPECTIVE dimension

Perspective-related ambiguities (cf. Schwager 2007 & Harris 2007)

Two face-down cards, the ace of hearts and the ace of spades.
You know that the winning card is the ace of hearts, but you don't know whether it's the card on the left or the one on the right.

(12) You know the winning card.

True or false?

Two salient ways to identify the cards:

- By their position: the card on the left, the card on the right
- By their suit: the ace of hearts, the ace of spades

Whether (12) is judged true or false depends on which of these perspectives is adopted.

Conceptual Covers

- Identification methods can be formalized as *conceptual covers*.
- A conceptual cover CC is a set of concepts such that in each world, every individual instantiates exactly one concept in CC.

The card scenario

$$\begin{array}{lccc} w_1 & \mapsto & \heartsuit & \spadesuit \\ w_2 & \mapsto & \spadesuit & \heartsuit \end{array}$$

Only two conceptual covers definable in this model:

(13) $\{\lambda w.[\![\iota x.\text{ON-THE-LEFT}(x)]\!]_w, \lambda w.[\![\iota x.\text{ON-THE-RIGHT}(x)]\!]_w\}$

(14) $\{\lambda w.[\![\iota x.\text{ACE-OF-SPADES}(x)]\!]_w, \lambda w.[\![\iota x.\text{ACE-OF-HEARTS}(x)]\!]_w\}$

(15) $\#\{\lambda w.[\![\iota x.\text{ON-THE-LEFT}(x)]\!]_w, \lambda w.[\![\iota x.\text{ACE-OF-HEARTS}(x)]\!]_w\}$

Quantification under conceptual covers

- Variables as non-rigid designators;
- Special indices $n \in N$ added to the variables in the language;
- A *conceptual perspective* $\wp$ maps indices to CCs;
- An *assignment under a perspective* $g_\wp$ maps variables x_n to concepts in $\wp(n)$, rather than individuals:

(19) $[\![\exists x_n \phi]\!]_{M,w,g_\wp} = 1 \text{ iff } \exists c \in \wp(n) : [\![\phi]\!]_{M,w,g_\wp[x_n/c]} = 1$

(20) $[\![?\vec{x_n}\phi]\!]_{M,w,g_\wp} = \{v \mid \forall \vec{c} \in \wp(\vec{n}) : [\![\phi]\!]_{M,w,g_\wp[\vec{x_n}/\vec{c}]} = [\![\phi]\!]_{M,v,g_\wp[\vec{x_n}/\vec{c}]}\}$

- But the denotation of a variable in a world is an individual, and not a concept:

(21) $[\![x_n]\!]_{M,w,g_\wp} = (g_\wp(x_n))(w)$ [not type (s, e), but e]

Questions under cover

Illustration: the card scenario again

(22) a. Which is the winning card?
b. $?x_n.\ x_n = \iota x.\textsc{winning-card}(x)$

(23) Two salient resolutions:
a. $\wp(n) = \{\text{left, right}\}$
b. $\wp'(n) = \{\text{hearts, spades}\}$

(24) Different possible answers under different perspectives:
a. Under $\wp$: The card on the left is the winning card; The card on the right is the winning card.
b. Under $\wp'$: The ace of hearts is the winning card; The ace of spades is the winning card.

(25) a. You know which is the winning card.
b. $K_a(?x_n.\ x_n = \iota x.\textsc{winning-card}(x))$

(25) true under $\wp'$, false under $\wp$.

Questions under cover

Further application

In multi-constituent questions different variables may range over different covers:

(26) a. You don't know which card is which.
b. $\neg K_a(?x_m y_n.\ x_m = y_n)$

(27) a. $\wp(n) = \{\text{left, right}\}$
b. $\wp(m) = \{\text{hearts, spades}\}$

Aloni (2007)

Main idea: CQs as embedded identity questions

(28) a. John knows the capital of Italy.
b. John knows which is the capital of Italy.

Type Shift

(29) $\uparrow_n \alpha \;=_{\text{def}}\; ?x_n.\ x_n = \alpha$

$\uparrow_n$ transforms an entity-denoting expression α into the identity question $?x_n.\ x_n = \alpha$, where x_n ranges over some pragmatically determined cover.

Illustration

(30) a. John knows the capital of Italy.
b. $K_j(\uparrow_n \iota x.\text{CAPITAL-OF-ITALY}(x))$
c. $K_j(?x_n.\ x_n = \iota x.\text{CAPITAL-OF-ITALY}(x))$

where x_n ranges over $\{$Berlin, Rome, Paris, $\ldots\}$

More Illustrations

Cards

(31) Anna knows the winning card.

(32) $K_a(\uparrow_n \iota x.\text{WINNING-CARD}(x))$

with x_n ranging either over {left, right} or over {spades, hearts}.

Quantified CQs

(33) John knows every phone number.

(34) $\forall x_n(\text{PHONENUMBER}(x_n) \rightarrow K_j(\uparrow_m x_n))$

where:

- x_n ranges over {Paul's phone number, Katrin's phone number, ...}
- x_m ranges over {5403, 5431, ...}

More Illustrations

Heim's Ambiguity (definite CCQ)

(35) John knows the capital that Fred knows.

a. Reading A: John and Fred know the same capital.

$$\exists x_n(x_n = \iota x_n[C(x_n) \wedge K_f(\uparrow_m x_n)] \wedge K_j(\uparrow_m x_n)) \qquad (\textit{de re})$$

b. Reading B: John knows which capital Fred knows.

$$K_j(\uparrow_n \iota x_n[C(x_n) \wedge K_f(\uparrow_m x_n)]) \qquad (\textit{de dicto})$$

where:

- x_n ranges over {the capital of Germany, the capital of Italy, ...}
- x_m ranges over {Berlin, Rome, ...}

Problem 1: quantified CQs are ambiguous (Heim, 1979)

(36) John knows every phone number.

(37) Pair-list reading
John knows that Paul's number is 5403, that Katrin's number is 5431, etc.

(38) Set reading
John knows which numbers are someone's phone number, and which are not.

Aloni (2007) only captures the pair-list reading.

Problem 2: quantified CCQs

(39) John knows the capital that Fred knows.

a. Reading A: $\exists x_n(x_n = \alpha \wedge K_j(\uparrow_m x_n))$

b. Reading B: $K_j(\uparrow_n \alpha)$

(40) John knows every capital.

$\forall x_n(P(x_n) \rightarrow K_j(\uparrow_m x_n))$

(41) John knows every capital that Fred knows.

- Aloni (2007) derives the ambiguity of (39) as a *de re*/*de dicto* ambiguity.
- But the account of quantified CQs assumes a *de re* representation.
- Therefore, reading B in (41) is not captured.

Problem 3: Greenberg's observation

The observation

(42) John found out the murderer of Smith.

(43) John found out who the murderer of Smith was.

(43) does not necessarily entail that John found out of the murderer of Smith *that he murdered Smith*; (42) does.

The problem

(44) John found out the murderer of Smith.

a. $F_j(\uparrow_n \iota x.\textsc{murderer-of-Smith}(x)))$

b. $\exists y_m(y_m = \iota x.\textsc{murderer-of-Smith}(x) \wedge F_j(\uparrow_n y_m))$

Reading (44)-b does not necessarily entail that John solved Smith's murder. y_m need not range over $\{$the murderer of Smith, $\ldots\}$

Roelofsen & Aloni 2008

Type shift

(45) $\uparrow_{(n,P)} \alpha \;=_{\text{def}}\; ?x_n.P(\alpha)$

Two Pragmatic Parameters in $\uparrow_{(n,P)}$

- n is some contextually determined conceptual cover;
- P is a contextually determined property, generally
  - the property of being identical to x_n [pair-list readings]
  - the property expressed by the CQ noun phrase [set readings]

Solution to problems 1 and 2, but no account of Greenberg's observation.

New proposal

Labeled variables (cf. Frana's (2009) descriptive traces)

- When CQs undergo movement they leave a 'labeled' trace:

(46) John knows *every capital that Fred knows*.

[[every capital F knows]$_i$ J knows t_i^{CAPITAL}]

[[every capital F knows]$_i$ J knows $t_i^{\text{CAPITAL THAT F KNOWS}}$]

- A 'labeled' variable $x_{n,P}$ expresses a concept in $\wp(n)$, which in each world w instantiates an individual that satisfies P in w.

Two type shift rules

- Labeled terms α_P can undergo two type-shift rules:

(47) Specificational: $\uparrow_n \alpha_P \ =_{\text{def}} \ ?x_n.\ x_n = \alpha_P$

(48) Predicational: $\uparrow \alpha_P \ =_{\text{def}} \ ?P(\alpha)$

Solution Problem 1

Quantified CQs

(49) John knows every telephone number.

Pair-list readings via specificational shift

(50) a. $\forall x_n(\text{TEL-NR}(x_n) \rightarrow K_j(\uparrow_m x_{n,\text{TEL-NR}})$
b. $\forall x_n(\text{TEL-NR}(x_n) \rightarrow K_j(?x_m.\ x_m = x_{n,\text{TEL-NR}}))$

x_n ranges over {Paul's phone number, Katrin's phone number, ...}
x_m ranges over {5403, 5431, ...}

Set-readings via predicational shift

(51) a. $\forall x_n(\text{TEL-NR}(x_n) \rightarrow K_j(\uparrow x_{n,\text{TEL-NR}}))$
b. $\forall x_n(\text{TEL-NR}(x_n) \rightarrow K_j(?\ \text{TEL-NR}(x_n)))$

x_n ranges over {5403, 5431, ...}

Solution Problem 2

Quantified CCQs

(52) John knows every capital that Fred knows.

Reading A: [label = CAPITAL]

- Pair-list: for every country such that Fred knows its capital, John also knows its capital [SPEC: $\uparrow_n$]
- Set: for every capital of which Fred knows that it is a capital, John also knows that it is a capital [PRED: $\uparrow$]

Reading B: [label = CAPITAL THAT FRED KNOWS]

- Pair-list: for every country such that Fred knows its capital, John knows that it is a country such that Fred knows its capital [SPEC]
- Set: for every capital of which Fred knows that it is a capital, John knows that it is a capital such that Fred knows it is a capital [PRED]

Solution Problem 2

Quantified CCQs

(53) John knows every capital that Fred knows.

Readings A [label = CAPITAL]

Pair-list reading via specificational shift: $[\uparrow_n x_{m,C} = ?x_n.\ x_n = x_{m,C}]$

(54) $\forall x_m((C(x_m) \wedge K_f(\uparrow_n x_{m,C}) \rightarrow K_j(\uparrow_h x_{m,C}))$

- x_m ranges over {the capital of Italy, the capital of France, ...}
- x_n and x_h range over {Rome, Berlin, Paris, ...}

Set-reading via predicational shift: $[\uparrow x_{m,C} = ?C(x_m)]$

(55) $\forall x_m((C(x_m) \wedge K_f(\uparrow x_{m,C}) \rightarrow K_j(\uparrow x_{m,C}))$

- x_m ranges over {Rome, Berlin, Paris, ...}

Solution Problem 2

Quantified CCQs

(56) John knows every capital that Fred knows.

Readings B [label = CAPITAL THAT FRED KNOWS]

Pair-list reading:

(57) $\forall x_m((C(x_m) \wedge K_f(\uparrow_n x_{m,C}) \rightarrow K_j(\uparrow x_{m,\lambda x_m.[C(x_m) \wedge K_f(\uparrow_n x_{m,C})]}))$

- x_m range over {the capital of Italy, the capital of France, ...}
- x_n ranges over {Rome, Berlin, Paris, ...}

Set-reading:

(58) $\forall x_m((C(x_m) \wedge K_f(\uparrow x_{m,C}) \rightarrow K_j(\uparrow x_{m,\lambda x_m.[C(x_m) \wedge K_f(\uparrow x_{m,C})]}))$

- x_m {Rome, Berlin, Paris, ...}

Solution Problem 3: Greenberg's observation

Possible representations

(59) John found out the murderer of Smith.

a. $F_j(\uparrow_n \iota x.\textsc{murderer-of-Smith}(x)))$

b. $\exists y_m(y_m = \iota x.\textsc{m-of-S}(x) \wedge F_j(?x_n.x_n = y_{m,\textsc{m-of-S}})$ [Specificational]

c. $\exists y_m(y_m = \iota x.\textsc{m-of-S}(x) \wedge F_j(?\textsc{m-of-S}(y_m))$ [Predicational]

- All three representations entail that John solved Smith's murder:
  In (b), y_m must range over $\{$the murderer of Smith, $\ldots\}$
  In (c), y_m cannot range over $\{$the murderer of Smith, $\ldots\}$

Paraphrases

- Specificational: Of the murderer of Smith John found out who it is.
- Predicational: Of the murderer of Smith John found out whether he is the murderer of Smith.

Remarks on cover resolution

Basic covers

Quantification is generally relative to a *basic* cover:

Naming: {Rome, Berlin, ...}

Rigid cover: {this, that, ...}

Identification is generally by *name* or by *ostention*.

Derived covers

But in the case of CQs it is also often relative to a *derived* cover.

Example: {the capital of Italy, the capital of Germany,...} is a derived cover based on {Italy, Germany,...} and the *capital-of* relation.

Labeled variables $x_{n,\mathrm{R}}$ trigger resolution to such derived covers.

Remarks on cover resolution

Constraints on cover resolution

- Quantification is generally relative to a basic cover;
- We shift to non-basic covers only:
  (i) to avoid trivial/contradictory meanings;
  (ii) to meet requirements of labeled variables.

Examples

Standard cases

(60) a. John knows the capital of Italy.
b. $K_j(\uparrow_n \iota x.\textsc{capital-of-Italy}(x)))$

- n: naming

(61) a. John knows every capital.
b. $\forall x_m(C(x_m) \rightarrow K_j(\uparrow_n x_{m,C}))$

- n: naming
- m: derived cover (triggered and made salient by $x_{m,C}$)

Ilaria's example

(62) a. John knows the shoe.
b. $K_j(\uparrow_n \iota x.\text{SHOE}(x)))$

Trivial/senseless if n is basic, acceptable only in contexts that make salient an alternative cover [e.g. Ilaria's scenario]

Maribel's counterexample

(63) a. Martin already knows the capital that Lucia knows.
b. $K_m(\uparrow_n \iota x_n[C(x_n) \wedge K_l(\uparrow_k x_{n,C})])$

- n: derived cover (triggered by $x_{n,C}$)
- k: naming

(64) a. #Lucia knows the capital that Martin already knows.
b. $\exists x_n(x_n = \iota x_n[C(x_n) \wedge K_m(\uparrow_j x_n)] \wedge K_l(\uparrow_k x_n))$

- n and k as above
- j: {the capital that Lucia knows, ...} $\leftarrow$ **impossible resolution**

  because j can be interpreted as naming, therefore it should be interpreted as naming.

Maribel's counterexample

But don't we ever need such resolution?

NO, not even for B readings of quantified cases!

Quantified case: reading B/pair-list

(65) a. John knows every capital that Fred knows.

b. $\forall x_m((C(x_m) \wedge K_f(\uparrow_n x_{m,C}) \rightarrow K_j(\uparrow x_{m,\lambda x_m.[C(x_m) \wedge K_f(\uparrow_n x_{m,C})]}))$

c. $\forall x_m((C(x_m) \wedge K_f(\uparrow_n x_{m,C}) \rightarrow K_j?(C(x_m) \wedge K_f(\uparrow_n x_{m,C})])$

- x_m range over {the capital of Italy, the capital of France, ...}
- x_n ranges over {Rome, Berlin, Paris, ...}

Conclusion

Summary

- Conceptual covers: useful tool for perspicuous representations of CQ meaning (Heim ambiguity, pair-list readings);
- Structural constraints on pragmatic cover selection (via labeled variables);
- Set-readings accounted by predicational shifts.

Future concealed questions

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