On concealed questions

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Outline

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    - Concealed questions: basic data
    - Previous analyses of concealed questions
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- Conclusions
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    - Some challenging data
    - Constraints on resolution and CC selection

Reference
Maria Aloni and Floris Roelofsen. A Pragmatic Perspective on Concealed
Questions, forthcoming in *Linguistics and Philosophy*

Concealed Questions (CQs)

Concealed questions are nominals naturally read as identity questions

Some examples

(1) a. John knows the price of milk.
     b. They revealed the winner of the contest.
     c. Mary discovered the murderer of Smith.
     d. Ann told me the time of the meeting.

Paraphrases

(2) a. John knows what the price of milk is.
     b. They revealed who the winner of the contest was.
     c. Mary discovered who the murderer of Smith is.
     d. Ann told me what the time of the meeting is.

Acquaintance (ACQ) *vs* concealed question (CQ) readings

(3) Mary knows the capital of Italy.
   a. ACQ: She knows Rome.
   b. CQ: She knows what the capital of Italy is.

Diagnostic test: substitution of identicals allowed only for ACQ

(4) Mary knows the capital of Italy.
   a. ACQ $\Rightarrow$ She knows$_{ACQ}$ Rome
   b. CQ $\not\Rightarrow$?She knows$_{CQ}$ Rome

In many languages epistemic 'know' and acquaintance 'know' are lexically distinct

(5) a. German: *wissen*$_{\mathrm{EPI}}$+ NP (only CQ) vs. *kennen*$_{\mathrm{ACQ}}$ (Heim 1979)
   b. Dutch: *weten*$_{\mathrm{EPI}}$ + NP (only CQ) vs. *kennen*$_{\mathrm{ACQ}}$
   c. Italian: *sapere*$_{\mathrm{EPI}}$ + NP (only CQ) vs. *conoscere*$_{\mathrm{ACQ}}$ (Frana 2007)

   (i) Maria *sa*$_{\mathrm{EPI}}$ la capitale dell'Italia.   [CQ/#ACQ]

Basic Data (Heim 1979)

Definite CQs

(6)   John knows the capital of Italy.

Quantified CQs

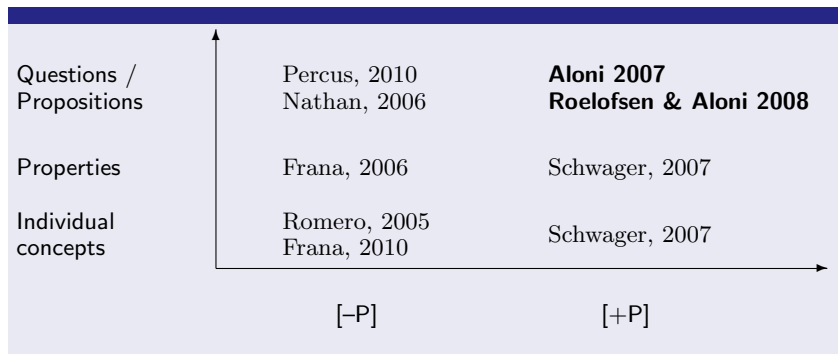(7)   John knows every European capital.

CQ-containing CQs (CCQs) (aka Heim's Ambiguity)

(8)   John knows the capital that Fred knows.

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

Reading B: John knows which capital Fred knows

Recent Approaches

	[–P]	[+P]
Questions / Propositions	Percus, 2010 Nathan, 2006	**Aloni 2007** **Roelofsen & Aloni 2008**
Properties	Frana, 2006	Schwager, 2007
Individual concepts	Romero, 2005 Frana, 2010	Schwager, 2007

Main features of our proposals

- TYPE dimension: 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

(9)   They knew <u>the winner of the contest</u> and that the President of the association would hand out the prize in person.

(10)   I only knew <u>the capital of Italy</u> 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}.

    (11)   John knows$_{\text{ACQ}}$ Barack Obama.

    (12)   John knows$_{\text{EPI}}$ what is the capital of Italy and that it is a very old town.

Groenendijk & Stokhof (1984) on questions and knowledge

Questions

Questions denote their true exhaustive answers (propositions):

(13)   a.   What is the capital of Italy?
       b. $?x.\ x = \iota x.\text{CAPITAL-OF-ITALY}(x)$
       c. $\lambda w.[\![\iota x.\text{CAPITAL-OF-ITALY}(x)]\!]_w = [\![\iota x.\text{CAPITAL-OF-ITALY}(x)]\!]_{w_0}$
       d. $\lambda w.$ Rome is the capital of Italy in w

Knowledge

John knows$_{\text{EPI}}$ α iff John's epistemic state entails the denotation of α

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

(15)   Rome is the capital of Italy & John knows what 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.

(16)   a.   You know the winning card.
          b.   You know which card is 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 (16-a,b) are judged true or false depends on which of these
perspectives is adopted.

Conceptual Covers (Aloni 2001)

- Identification methods can be formalized as *conceptual covers*:

  (17)   A conceptual cover CC is a set of concepts such that in each
         world, every individual instantiates exactly one concept in CC.

- In the cards scenario, 3 salient covers/ways of identifying the cards:

  (18)   a.   {on-the-left, on-the-right}   [ostension]
         b.   {ace-of-spades, ace-of-hearts}   [naming]
         c.   {the-winning-card, the-losing-card}   [description]
         d.   #{on-the-left, ace-of-spades}

- Evaluation of (19) depends on which of these covers is adopted:

  (19)   a.   You know which$_n$ card is the winning card.
         b. $K_a(?x_n.\ x_n = \iota x.\text{WINNING-CARD}(x))$

  (20)   a.   False, if $n \mapsto$ {on-the-left, on-the-right}
         b.   True, if $n \mapsto$ {ace-of-spades, ace-of-hearts}
         c.   Trivial, if $n \mapsto$ {the-winning-card, the-losing-card}

  $\mapsto$ CC-indices n added to logical form, their value is contextually supplied

Concealed questions under cover (Aloni 2007)

Main idea: CQs as embedded identity questions

(21)   a.   John knows the capital of Italy.
       b.   John knows what the capital of Italy is.

Type Shift

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

$\uparrow_n$ transforms an entity-denoting expression α into the identity question 'who$_n$/what$_n$ is α?', where n is a pragmatically determined conceptual cover

Illustration

(23)   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, $\dots\}$

fct1 Rome is the capital of Italy & John knows the capital of Italy $\models$ John knows that Rome is the capital of Italy

More Illustrations

Cards

(24)   a.   Anna knows the winning card.

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

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

Quantified CQs

(25)   a.   John knows every European capital.

          b. $\forall x_n(\text{EUROPEAN-CAPITAL}(x_n) \rightarrow K_j(\uparrow_m x_n))$

where:

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

—— —— —— —— ——

fct2 Berlin is the capital of Germany & John knows every European capital $\models$ John knows that Berlin is the capital of Germany

More Illustrations

Heim's Ambiguity (definite CCQ)

(26) John knows the capital that Fred knows.

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

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

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

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

where:

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

―――― ―――― ―――― ―――― ――――

fct3 Fred knows that the capital of Italy is Rome & John knows the capital that
Fred knows [Reading A] $\models$ John knows that the capital of Italy is Rome

fct4 Fred knows that the capital of Italy is Rome & John knows the capital that
Fred knows [Reading B] $\not\models$ John knows that the capital of Italy is Rome

Problem 1: quantified CQs are ambiguous (Heim 1979)

(27)   John knows every phone number.
   a.   <u>Pair-list reading</u>: John knows that Paul's number is 5403, that
        Katrin's number is 5431, etc.
   b.   <u>Set reading</u>: 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

- Aloni (2007) derives the ambiguity of (28) as a *de re*/*de dicto* ambiguity:

  (28)   John knows the capital that Fred knows.
       a.   <u>Reading A</u>: $\exists x_n(x_n = \alpha \land K_j(\uparrow_m x_n))$
       b.   <u>Reading B</u>: $K_j(\uparrow_n \alpha)$

- But the account of quantified CQs assumes a *de re* representation:

  (29)   John knows every capital.
       $\forall x_n(C(x_n) \rightarrow K_j(\uparrow_m x_n))$

- Therefore, reading B of a quantified CCQ like (30) is not captured:

  (30)   John knows every capital that Fred knows.
       'for every country such that Fred knows its capital, John knows that it is a country such that Fred knows its capital'

Solution to Problem 1 and 2: Roelofsen & Aloni 2008

New type shift

(31) $\uparrow_{(n,P)} \alpha =_{\text{def}} ?x_n.P(\alpha)$ [cf. old: $\uparrow_n \alpha =_{\text{def}} ?x_n.x_n = \alpha$]

Two pragmatic parameters in $\uparrow_{(n,P)}$

- n is some contextually determined conceptual cover;
- P is a contextually determined property:
    - Either the property of being identical to x_n:

      (32)   <u>Specificational</u>: $\uparrow_{n,P} \alpha =_{\text{def}} ?x_n.\ x_n = \alpha$

    - Or another salient property (generally the one expressed by the CQ):

      (33)   <u>Predicational</u>: $\uparrow_{n,P} \alpha =_{\text{def}} ?P(\alpha)$

Solution Problem 1: Quantified CQs

(34) a. John knows every telephone number.
b. $\forall x_n(\text{PHONE-NUMBER}(x_n) \rightarrow K_j(\uparrow_{m,P} x_n))$
c. $\forall x_n(\text{PHONE-NUMBER}(x_n) \rightarrow K_j(?x_m.P(x_n)))$

Pair-list reading via specificational shift $\qquad\qquad P \rightarrow \lambda y.y = x_m$ (Id)

(35) $\forall x_n(\text{PHONE-NUMBER}(x_n) \rightarrow K_j(?x_m.x_m = x_n))$

- $n \rightarrow \{\text{Ann's phone number, Bill's phone number, } \dots \}$
- $m \rightarrow \{5403, 5431, \dots \}$

Set reading via predicational shift $\qquad\qquad\qquad P \rightarrow \text{PHONE-NUMBER}$

(36) $\forall x_n(\text{PHONE-NUMBER}(x_n) \rightarrow K_j(?\text{PHONE-NUMBER}(x_n)))$

- $n, m \rightarrow \{5403, 5431, \dots \}$

Solution Problem 2

Quantified CCQs

(37) a. John knows every capital that Fred knows.
      b. $\forall x_m((\text{CAPITAL}(x_m) \wedge K_f(\uparrow_{h,P_1} x_m)) \rightarrow K_j(\uparrow_{n,P_2} x_m))$

<u>Reading A:</u> $[P_1 = P_2]$

- <u>Pair-list</u>: for every country such that Fred knows its capital, John also knows its capital $[P_1, P_2 \rightarrow \text{Id}, h = n]$
- <u>Set</u>: for every capital of which Fred knows that it is a capital, John also knows that it is a capital $[P_1, P_2 \rightarrow \text{CAPITAL}]$

<u>Reading B:</u> $[P_2 = \text{CAPITAL THAT FRED KNOWS}]$

- <u>Pair-list</u>: for every country such that Fred knows its capital, John knows that it is a country such that Fred knows its capital $[P_1 \rightarrow \text{Id}]$
- <u>Set</u>: for every capital of which Fred knows that it is a capital, John knows that Fred knows it is a capital $[P_1 \rightarrow \text{CAPITAL}]$

Conclusions

Summary

- Conceptual covers: useful tool for perspicuous representations of CQ meaning (Heim ambiguity, pair-list readings);
- Set-readings & B-readings accounted by predicational shifts;
- General pragmatic constraints on cover selection and P-resolution.

Future concealed questions

- CQs embedding verbs: know CQ, #believe CQ, #wonder CQ
- Predicational readings under non-factive verbs:

    (38)   John and Mary agree on every phone number.

- Logic: quantified modal logic $+$ CC (axiomatized in Aloni 2001) $+$ questions (?)
- . . .

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Solution Problem 2: Quantified CCQs

Readings A $P_1 = P_2$

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

b. $\forall x_m((\text{CAPITAL}(x_m) \land K_f(\uparrow_{h,P_1} x_m)) \to K_j(\uparrow_{n,P_2} x_m))$

Pair-list via specificational shift: $[P_1, P_2 \to \text{Id}, n = h]$

(40) $\forall x_m((\text{CAPITAL}(x_m) \land K_f(?x_n.x_n = x_m)) \to K_j(?x_h.x_h = x_m))$

- 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: $[P_1, P_2 \to \text{CAPITAL}]$

(41) $\forall x_m((\text{CAPITAL}(x_m) \land K_f(?\text{CAPITAL}(x_m))) \to K_j(?\text{CAPITAL}(x_m)))$

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

Solution Problem 2: Quantified CCQs

Readings B	$P_2 = \lambda x_m.[C(x_m) \wedge K_f(\uparrow_{h,P_1} x_m)]$

(42) a. John knows every capital that Fred knows.
     b. $\forall x_m((\text{CAPITAL}(x_m) \wedge K_f(\uparrow_{h,P_1} x_m)) \rightarrow K_j(\uparrow_{n,P_2} x_m))$

Pair-list via specificational shift:	$[P_1 \rightarrow \text{Id}]$

(43) $\forall x_m((\text{CAP}(x_m) \wedge K_f(?x_n.x_n = x_m)) \rightarrow K_j(?(\text{CAP}(x_m) \wedge K_f(?x_n.x_n = x_m))))$

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

Set-reading via predicational shift:	$[P_1 \rightarrow \text{CAPITAL}]$

(44) $\forall x_m((\text{CAP}(x_m) \wedge K_f(?\text{CAP}(x_m))) \rightarrow K_j(?(\text{CAP}(x_m) \wedge K_f(?\text{CAP}(x_m)))$

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

Problem 3: prices, temperatures, . . .

- Sentence (45-a) involves quantification over set (45-b):

  (45) a. John knows the price that Fred knows.
        b. {the price of milk, the price of butter, . . . }

- But (45-b) need not be a conceptual cover:
  - Milk and butter might have the same price (no uniqueness)
  - 1 euro need not be the price of anything (no existence)
  - The price of milk might have not been fixed yet (no total functions)

- Same problem with temperatures, scores, dates of birth, colors, etc.

A Possible Solution to Problem 3

Distinction between basic and derived covers

- Only *basic* covers must satisfy the original requirements of uniqueness and existence;
- *Derived* covers are obtained from basic covers C and functions f as:

  (46) $\{c \mid \exists c' \in C. \forall w.\ f_w(c'(w)) = c(w)\}$

Examples of derived covers

(47) $\{$the capital of Italy, the capital of Germany,... $\}$
         based on $\{$Italy, Germany,... $\}$ and the *capital-of* function

(48) $\{$the price of milk, the price of butter, ... $\}$
         based on $\{$milk, butter, ... $\}$ and the *price-of* function

Some challenging data: Greenberg's Observation

The observation

(49)   John found out the murderer of Smith.

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

(50) does not necessarily entail that John found out of the murderer of Smith *that he murdered Smith*; (49) does.

The problem

(51)   a.   John found out the murderer of Smith.
        b. $\exists y_m(y_m = \iota x.\text{MURDERER-OF-SMITH}(x) \wedge F_j(\uparrow_{(n,P)} y_m))$

(51-b) does not necessarily entail that John solved Smith's murder:
P need not be MURDERER-OF-SMITH, m, n need not range over {the murderer of Smith, . . . }.

Exceptions to Greenberg's Observation

The guy with the broken hip

Context: There are ten men in a room, three of them are murderers.
John has to find out which of the men are murderers.

(52)   So far John only found out the guy with the broken hip.

On its most natural reading, this sentence says that John found out that
the guy with the broken hip was one of the murderers. Crucially, it does
not entail that John found out that the guy with the broken hip had a
broken hip.

Exceptions to Greenberg's Observation

Obama's daughters

Context: Michelle Obama talking to her daughters:

(53)   Today I went to visit a primary school in the neighborhood.
       There was this child, John, who had a very tough day. He was
       asked to learn the presidents of all American countries, but
       during the exam he only knew your father.

On its most natural reading, the last sentence means that John only
knew the president of the US. Crucially it does not entail that he knew
that Barack Obama is Malia Ann's and Sasha's father.

Towards a Pragmatic Solution

- These counterexamples are hard, if not impossible, to explain on a *structural* account of Greenberg's contrast (e.g. Frana);
- Our pragmatic theory is flexible enough to capture exceptions to Greenberg's observation, but it might overgenerate;
- To avoid excess meanings we need to properly constrain the contextual process of index resolution.

One last example (from Romero 2009)

Lucia

Lucia just learnt her first capital at the Kindergarten: she learnt that the capital of France is *Paris*. When her mom picked her up and heard the news from the care-takers, she decided to play a guessing game on her husband in the evening: Martin, the husband, would have to find out which capital Lucia learnt today/the capital that Lucia knows. But guess what! It turns out that Martin called the Kindergarten earlier today and heard the news as well. Martin can't tell what capital Mommy knows, but now he can tell what capital Lucia knows. This means that Lucia's mom won't be able to play her guessing game, because ...

(54)   a.   ... Martin already knows the capital that Lucia knows.
           b.   ... #Lucia knows the capital that Martin (already) knows.

Constraints on resolutions (building on Aloni 2001)

Default resolutions for P and n

- P is *typically* resolved to
  - the identity property;
  - the property expressed by the CQ noun phrase.
- Cover indices n are *typically* resolved to
  - the rigid cover (if available);
  - naming;
  - a derived cover (if made salient by a lexically relational noun in CQ).

Exceptional resolutions

We shift to other *salient* properties/covers only:

(i) to avoid trivial/contradictory/irrelevant meanings [quality, quantity relevance]

(ii) unless the same meaning can be expressed by a more perspicuous/effective form [manner as **blocking**]

Applications: Greenberg's example

Possible representation and salient values

(55)   John found out the murderer of Smith.

    a. $F_j(\uparrow_{(n,P)} \iota x.\text{MURDERER-OF-SMITH}(x)))$

    b. $\exists y_m(y_m = \iota x.\text{M-OF-S}(x) \land F_j(\uparrow_{(n,P)} y_m)$

<u>In a neutral context:</u>

- Salient cover: naming
- Salient properties: identity, MURDERER-OF-SMITH

Predicted resolutions

- For (55-a): $P \rightarrow \text{Id}$ & $n \rightarrow$ naming $[P \rightarrow \text{M-OF-S} \Rightarrow \text{trivial}]$

  'John found out who is the murderer of Smith'

- For (55-b): $P \rightarrow \text{M-OF-S}$ & $m \rightarrow$ naming $[P \rightarrow \text{Id} \Rightarrow \text{trivial}]$

  'Of the murderer of Smith John found out whether he is the murderer of Smith'

Applications: The guy with the broken hip

Possible representation and salient values

(56)   John found out the guy with the broken hip.
   a. $F_j(\uparrow_{(n,P)} \iota x.\text{GUY-WITH-BROKEN-HIP}(x)))$
   b. $\exists y_m(y_m = \iota x.\text{GUY-W-B-H}(x) \land F_j(\uparrow_{(n,P)} x_m)$

- Salient cover: naming/ostension
- Salient properties: identity, GUY-WITH-BROKEN-HIP, <u>MURDERER</u>

Predicted resolution

- For (56-a): $P \rightarrow$ <u>MURDERER</u>   [others trivial or irrelevant]

  'John found out whether the guy with a broken hip is a murderer'

- For (56-b): $P \rightarrow$ <u>MURDERER</u> & $m \rightarrow$ nam/ost [others trivial or irrelevant]

  'Of the guy with a broken hip, John found out whether he is a murderer'

- Blocking check: Is there another more effective way to express this meaning in context? No.

Applications: Obama's daughter

Possible representation and salient values

(57) John knew your father.

    a. $K_j(\uparrow_{(n,P)} \iota x.\text{YOUR-FATHER}(x))$

    b. $\exists x_m(x_m = \iota x.\text{YOUR-FATHER}(x) \wedge K_j(\uparrow_{(n,P)} x_m))$

- Salient cover: naming, <u>presidents</u>
- Salient properties: identity, YOUR-FATHER, ...

Predicted resolution

- For (57-a): either trivial $[P \to \text{YOUR-FATHER}]$ or irrelevant $[P \to Id]$
- For (57-b): $P \to Id$ & $m \to \underline{\text{presidents}}$ & $n \to$ naming   [others triv or irr]

  'John knew who is the president of the US'

- Blocking check: Is there another more effective way to express this meaning in context? No ('your father' better than 'the president of US')

Applications: Lucia

Possible representation and salient values

(58)   Lucia knows the capital that Martin already knows.
    a. $K_l(\uparrow_{(0,P_0)} \iota x_0[C(x_0) \wedge K_m(\uparrow_{(1,P_1)} x_0)])$
    b. $\exists x_0(x_0 = \iota x_0[C(x_0) \wedge K_m(\uparrow_{(1,P_0)} x_0)] \wedge K_l(\uparrow_{(2,P_1)} x_0))$

- Salient cover: naming, capitals
- Salient properties: identity, CAPITAL-M-KNOWS, <u>CAPITAL-L-KNOWS</u>, . . .

Resolutions

- For (58-a): all either trivial or irrelevant
- For (58-b): $0 \rightarrow$ capitals & $P_0 \rightarrow$ CAP-L-KNOWS & $P_1 \rightarrow$ Id & $2 \rightarrow$ naming   [others trivial or irrelevant]

  'Martin already knows the capital that Lucia knows'
- Blocking check: Is there another more effective way to express this meaning in context? **Yes!** $\Rightarrow$ back to irrelevant meaning