HOW DO YOU ANSWER A CONCEALED QUESTION?
A Flexible Approach

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SNEWS, MIT // 20 October, 2007

1 What are Concealed Questions?

CONCEALED QUESTION: A Determiner Phrase (the captain of the ship) whose meaning may be paraphrased as an indirect identity question (who the captain of the ship is): Baker (1968), Grimshaw (1979), Heim (1979), Romero (2004, et seq), Nathan (2006), Frana (2007), and Schwager (2007).

(1) OBJECT POSITION:
   a. John knows/disclosed the captain of the ship
   b. John knows/disclosed who the captain of the ship is

(2) SUBJECT POSITION:
   a. The winner of the cook-off is normally determined/predicted/set by the audience
   b. Who the winner of the cook-off is is normally determined/predicted/set by the audience

(3) SUBJECT AND OBJECT POSITION:
   a. The temperature of the lake depends on the season
   b. What the temperature of the lake is depends on what the season is

1.1 How to spot a CQ in the wild

From the existing literature, we can piece together a cluster of properties that distinguish CQs from run-of-the-mill DPs:

<table>
<thead>
<tr>
<th>Core Characteristics of CQs</th>
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<tbody>
<tr>
<td>I. Diagnostically, CQs can typically be paraphrased as indirect questions (IQ)</td>
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<td>II. CQs require neuter anaphora (It/*he is Captain Jack Sparrow)</td>
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<td>III. CQ interpretations do not survive when conjoined with individual-selecting verbs (# predicted and kissed the winner)</td>
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<td>IV. CQ environments do not follow extensional entailment patterns</td>
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<tr>
<td>V. CQs lack an ambiguity present in their question paraphrase (Greenberg's observation)</td>
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</table>
2 Motivating Greenberg’s observation

Greenberg’s observation (Greenberg, 1977): is in essence a condition on answerhood – answers to CQs can only be those that identify the individual in question by giving a direct answer (e.g., a name), rather than merely individuating that individual by an indirect answer (see Rescher (2005) for more on the distinction).

(4) John found out Smith’s murderer
   a. John found out that Jones has murdered Smith
   b. # John found out that whomsoever murdered Smith left a shoe print in the garden

(5) John found out who Smith’s murderer is
   a. John found out that Jones has murdered Smith
   b. John found out that whomsoever murdered Smith left a shoe print in the garden

The first problem: If true, the dichotomy threatens to complicate our most basic method of identifying a CQ – CQs are DPs with question paraphrases. But then CQs are not interpreted as questions are, lacking as they do the ambiguity in (5).

The second problem: Although Greenberg’s generalization holds in most contexts, it doesn’t seem to hold in all. Rather, there are systematic counterexamples that contravene on the generality of the observation. (See next section)

The fix to the second problem: We explore the fringe cases and develop an account to handle these cases. In particular, we will need to examine why direct answers (identification) are preferred over indirect ones (individuation), and when individuation is sufficient.

The fix to the first problem: CQs are not unique in preferring a direct over indirect answers in unbiased contexts. We see that answers must conform to a stringent pragmatic constraint (Conceptual Covers) that allows the conflation of identification and individuation in very limited contexts.

3 The fringe

Case 1: The proclamation scenario. Suppose that King Herod rules in a time of great economic turmoil, and that one of his many duties is to oversee certain stock commodities of the market, such as the price of milk. Prices for products shift as turmoil in the region halts travel into Judea and he grows weary of re-establishing these prices. So Herod makes a bold proclamation:

(6) The price of milk is the price of orange juice, whatever that may be!

Herod’s biographer, Flavius Josephus, later writes from his armchair:

(7) a. And thusly did King Herod determine the price of milk
    b. And thusly did King Herod determine what the price of milk was

The point: Herod needn’t have known the price of orange juice, and so in determining the price of milk he identified it with another description/concept. In other words, there is no direct answer to the concealed question.
Case 2: The sufficient description. Suppose that John studies election procedures in professional academic organizations, and he takes the LSA as one of his case studies. He discovers that the president of the LSA is always the linguist who has published the most article in Language the year before. Perhaps this fact reflects a bizarre anomaly of chance or is encoded in the by-laws of the organization. At a conference, he is asked to estimate the LSA’s next president.

(8) The (Concealed/Indirect) Question:
   a. John predicted/guessed the president of the LSA
   b. John predicted/guessed who the president of the LSA is

(9) Two possible answers:
   a. It is Professor Aaron Aaronson
   b. It is the linguist who has published the most articles in Language the year before

The point: Either method of picking out the relevant individual is acceptable in Case 1 and 2. One might be preferred over the other as more informative or relevant in varying contexts.

How to interpret the counter-evidence: The scenarios do not show that the observation is incorrect, but rather in need of revising. The relevant facts to consider are:

Revision of Greenberg’s observation:
- CQs prefer direct answers.
- Indirect answers are acceptable when they properly individuate the individual.

What we need: A theory which (a) provides enough flexibility to allow indirect answers in CQs, and (b) explains the contexts in which identification and individuation converge.

4 A Pragmatic Account of CQs

4.1 Background: Partition Semantics for Questions

   i. Answers to questions are propositions.
   ii. Questions exhaustively partition logical space (the set of possible worlds) into mutually exclusive cells, according to how the issue raised by the question is resolved.
   iii. Question meanings are propositional concepts: intensionalized sets of worlds \( \langle s, \langle s, t \rangle \rangle \)
4.2 Background: Conceptual Covers

The intuitive idea: There are multiple ways to view a domain: by name, by unique description, etc. A Conceptual Cover collects ways of individuating $D_e$, the domain of individuals, (i) completely and (ii) exhaustively.

Definition 4.1. [Conceptual Covers] Let $W$ be a set of worlds and $D$ the domain of individuals. A CC based on $⟨W,D⟩$ is a set of functions $W → D$, such that:

$$∀w ∈ W : ∀d ∈ D : ∃!c ∈ CC : c(w) = d$$

A conceptual cover is a set of individual concepts that satisfies the following condition: in a conceptual cover, in each world, each individual constitutes the instantiation of one and only one concept. Aloni (2001, 64)

Nom de plume. Many authors have had pen names. Charles Dodgson published “Alice in Wonderland” as Lewis Carrol; Mary Ann Evans published “Middlemarch” as George Eliot; Samuel Longhorn Clemens published “Huck Finn” as Mark Twain.
Given Name | Pen Name | The author of | Object in $D_e$
---|---|---|---
Charles Dodgson | Lewis Carrol | Alice in Wonderland | a
Mary Ann Evans | George Eliot | Middlemarch | b
Samuel Clemens | Mark Twain | Huck Finn | c

Figure 3: Mapping from conceptual covers in $C$ to $D_e$

4.3 Concealed Questions under Cover

The proposal: When $\alpha$, a nominal (the author of Alice in Wonderland), is interpreted as a CQ, it is interpreted as a relation between an answer (L. Carrol) from a cover (Nom de plume) and an identity question (Is L. Carrol the author of Alice in Wonderland?).

<table>
<thead>
<tr>
<th>CQ Nominal</th>
<th>Answer to CQ</th>
<th>Identity Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>the author of AiW</td>
<td>L. Carrol</td>
<td>Is L.Carrol the author of AiW in $w$ and $w'$?</td>
</tr>
<tr>
<td>$\langle s, e \rangle$</td>
<td>$\langle s, e \rangle$</td>
<td>$\langle s, \langle s, t \rangle \rangle$</td>
</tr>
</tbody>
</table>

Table 1: Schematic of Type Shifter $\mathcal{Q}$

(\mathcal{Q}) CONCEALED QUESTION TYPE SHIFTER

$$\langle s, e \rangle \mapsto \langle \langle s, e \rangle, \langle s, \langle s, t \rangle \rangle \rangle$$

$$\alpha_{(s,e)} \mapsto \lambda c_{(s,e)} \lambda w. \lambda w'. c \in CC[c(w) = \alpha(w) \land c(w') = \alpha(w')]$$

In prose: Applying $\mathcal{Q}$ to a concept $\alpha$ returns a function from individuating concepts $c$ to an identity question querying whether $c$ individuates $\alpha$ in reference worlds $w$ and $w'$.

Convention: We write $\lambda c \in CC. \lambda w. \lambda w'. c \langle w, w' \rangle \models \alpha \langle w, w \rangle$ instead. Conveys that shift is to a type of (relativized) identity.

The question paraphrase: Given that a noun has shifted to a CQ via $\mathcal{Q}$, and a cover $CC_i$, we apply the CQ to each concept $c_1, \ldots, c_n \in CC$, and a reference world $w_0$, we get a set of propositions: $\{\lambda w'. c_1 \langle w_0, w' \rangle \models \alpha \langle w_0, w' \rangle, \ldots, \lambda w'. c_n \langle w_0, w' \rangle \models \alpha \langle w_0, w' \rangle\}$. The union of these propositions results in a partition of logical space which is identical to that of an ordinary identity question: What is $\alpha$?
(11) **Route to the question paraphrase:**
A. Apply $\mathcal{Q}$ to $a$. Get CQ: $\lambda c. \lambda w. \lambda w'. [c\langle w, w'\rangle \vDash_\alpha \langle w, w'\rangle]$
B. Feed a concept $c_i$ in cover $CC_i$.
   Get propositional concept: $\lambda w. \lambda w'. [c\langle w, w'\rangle \vDash_\alpha \langle w, w'\rangle]$
C. Feed a reference world $w_0$. Get a proposition $\lambda w'. [c\langle w_0, w'\rangle \vDash_\alpha \langle w_0, w'\rangle]$
D. Repeat pointwise throughout $CC_i$.
E. Take union of propositions. Get a partition identical to regular identity question.

**Our example:**

(12) $[[\text{the author of Alice in Wonderland}]] = \lambda w. \text{tx.auth-AiW}(w)$
A. $\mathcal{Q}( [[\text{the author of Alice in Wonderland}]] ) = \lambda c \in CC. \lambda w. \lambda w'. [c\langle w, w'\rangle \vDash_\alpha \text{tx.auth-AiW}(x)(w, w')]$
B. For concept $\lambda w. \text{lc}(w)$ in the nom de plume cover:
   i. Is Lewis Carrol the author of “Alice in Wonderland”?
      $\lambda w. \lambda w'. [\text{lc}(w, w') \vDash_\alpha \text{tx.auth-AiW}(x)(w, w')]$
   ii. **Lewis Carrol is the author of “Alice in Wonderland” in $w_0$$\lambda w'. [\text{lc}(w_0, w') \vDash_\alpha \text{tx.auth-AiW}(x)(w_0, w')]$$
B'$. For concept $\lambda w. \text{ge}(w)$ in the nom de plume cover:
   i. Is George Eliot the author of “Alice in Wonderland”?
      $\lambda w. \lambda w'. [\text{ge}(w, w') \vDash_\alpha \text{tx.auth-AiW}(x)(w, w')]$
   ii. **George Eliot is the author of “Alice in Wonderland” in $w_0$$\lambda w'. [\text{ge}(w_0)(w') \vDash_\alpha \text{tx.auth-AiW}(x)(w_0)(w')]$$
B''$. For concept $\lambda w. \text{mt}(w)$ in the nom de plume cover:
   i. Is Mark Twain the author of “Alice in Wonderland”?
      $\lambda w. \lambda w'. [\text{mt}(w, w') \vDash_\alpha \text{tx.auth-AiW}(x)(w, w')]$
   ii. **Mark Twain is the author of “Alice in Wonderland” in $w_0$$\lambda w'. [\text{mt}(w_0, w') \vDash_\alpha \text{tx.auth-AiW}(x)(w_0, w')]$$
C. Collect all possible propositional answers via $\cup$.

| $\lambda w'. [\text{lc}(w_0, w') \vDash_\alpha \text{tx.auth-AiW}(x)(w_0, w')]$ | L. Carrol is the author of Alice in Wonderland |
| $\lambda w'. [\text{ge}(w_0, w') \vDash_\alpha \text{tx.auth-AiW}(x)(w_0, w')]$ | G. Eliot is the author of Alice in Wonderland |
| $\lambda w'. [\text{mt}(w_0, w') \vDash_\alpha \text{tx.auth-AiW}(x)(w_0, w')]$ | M. Twain is the author of Alice in Wonderland |

(13) John knows the author of Alice in Wonderland

*Means that in all of John's doxastic alternatives $\text{Dox}_J$, John has a way of identifying the author of “Alice in Wonderland” under a conceptual cover. If John is using the nom de plume scheme, then all of John's doxastic alternatives fall within the topmost partition.*
4.4 Back to Greenberg

Another conception: It turns out that under Schönfinkelization (Schönfinkel, 1924), we can view the CQ representation in another way: as a set of individual concepts from all available conceptual covers that answers the identity question.

<table>
<thead>
<tr>
<th>Conceptualization</th>
<th>Type</th>
</tr>
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<tbody>
<tr>
<td>Relations between individuating concepts and identity Qs</td>
<td>( \langle \langle s, e \rangle, \langle s, \langle s, t \rangle \rangle \rangle )</td>
</tr>
<tr>
<td>Set of concepts that individuates CQ NP in pair of worlds ( w \times w' )</td>
<td>( \langle s \times s, \langle \langle s, e \rangle, t \rangle \rangle )</td>
</tr>
</tbody>
</table>

Call this set \( \langle c \rangle_{\alpha, w, w'} \): the set of concepts generated by \( \alpha \) (the CQ NP) in reference worlds \( w \) and \( w' \). This is just the set of concepts that can correctly answer the question “What is \( \alpha \)?”

Why is this useful? It gives us a natural way of comparing concepts that answer the question paraphrase. Return to Case 2.

(14) The (Concealed/Indirect) Question:
   a. John predicted/guessed the president of the LSA
   b. John predicted/guessed who the president of the LSA is

(15) Two possible answers:
   a. It is Professor Aaron Aaronson
   b. It is the linguist who has published the most articles in Language the year before

<table>
<thead>
<tr>
<th>Cover</th>
<th>Concept</th>
<th>Extension</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Aaron</td>
<td>Rigidly denotes a</td>
</tr>
<tr>
<td></td>
<td>Baron</td>
<td>Rigidly denotes b</td>
</tr>
<tr>
<td>Description</td>
<td>Most published</td>
<td>Depends on world</td>
</tr>
<tr>
<td></td>
<td>Least published</td>
<td>Depends on world</td>
</tr>
</tbody>
</table>
By description

\[
\begin{array}{|c|c|c|c|c|}
\hline
\text{Worlds} & \text{President} & \text{Most published} & \text{Least Published} & \text{Aaron} & \text{Baron} \\
\hline
w_0 & a & a & b & a & b \\
w & a & a & b & a & b \\
w' & b & b & a & a & b \\
w'' & b & a & b & a & b \\
\hline
\end{array}
\]

Table 2: Model of extensions in worlds

- \( \lambda u. \) Most \( (w_0, u) \) \( \equiv \) Pr Ez \( (w_0, u) \)
- \( \lambda u. \) Least \( (w_0, u) \) \( \equiv \) Pr Ez \( (w_0, u) \)

By name

- \( \lambda u. \) Aaron \( (w_0, u) \) \( \equiv \) Pr Ez \( (w_0, u) \)
- \( \lambda u. \) Baron \( (w_0, u) \) \( \equiv \) Pr Ez \( (w_0, u) \)

Two facts fall out of this analysis:

1. Names are at least as informative as descriptions, given the referent of the name is known.
2. Names are more restrictive than descriptions: individuation by description can include worlds not tied to the actual world.

It does not guarantee that the individual denoted by \( c \) in some non-actual world \( v \) will be the same individual denoted by \( \alpha \) in the actual world \( w_0 \). As for our example, this discrepancy between actual and equivalent denotations is shown by the inclusion of world \( w' \) in the resulting partition by virtue of the fact that \( c(w') = \alpha(w') = b \), despite the fact that \( \alpha(w_0) = a \). That is, worlds in which \( \alpha \) denotes a different individual are still included in the partition.

- **Descriptions**: Possible that \( c \) and \( \alpha \) denote different objects at \( w_0 \) and \( w' \).
  
  \[
  \begin{align*}
  c(w_0) = \alpha(w_0) & \implies a \\
  c(w') = \alpha(w') & \neq b
  \end{align*}
  \]

- **Names**: \( c \) and \( \alpha \) must denote the same objects at \( w_0 \) and \( w' \), since names rigidly designate.

\[
\begin{align*}
  c(w_0) = \alpha(w_0) & \implies a \\
  c(w') = \alpha(w') & = a
\end{align*}
\]
Conclusion:

• A novel analysis of concealed questions was presented.

• Allows for flexible answers, within conrained contexts by:
  – Explaining when identification and individuation converge, and
  – Giving semantic content to the intuition behind Greenberg’s generalization, while accounting for the counterexamples.

• Related two interdefinable denotations of CQs, such that the set of concepts \( \llparenthesis c \rrparenthesis \) that individuate an object provides a basis for comparing concepts across Conceptual Covers in terms of general pragmatic notions, such as informativity or relevance.

References


Greenberg, B. (1977). A semantic account of relative clauses with embedded question interpretations. ms, UCLA.


