How do you Answer a Concealed Question?

A Flexible Approach

Jesse Harris //harris@linguist.umass.edu

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:

Core Characteristics of CQs

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

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 dichotemy threatens to complicate our most basic method of indentifying 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

(10) CENTRAL TENETS OF A PARTITION SEMANTICS: Groenendijk and Stokhof (1984, 1990, 1997)
   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 $\langle s, \langle s, t \rangle \rangle$

ϕ	Yes, it's raining
$\neg\phi$	No, it's not raining

Figure 1: Partition induced by "Is it raining?"

λw. no d is ϕ in w	No one is president of the LSA
λw. only d_1 is ϕ in w	AA is president of the LSA
λw. only d_2 is ϕ in w	BB is president of the LSA
$\vdots$	
λw. only d_1 and d_2 are ϕ in w	AA and BB are both president of the LSA
$\vdots$	
λw. all d are ϕ in w	Everyone is president of the LSA

Figure 2: Partition induced by "Who is the president of the LSA?"

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 $\langle W, D\rangle$ is a set of functions $W \mapsto D$, such that:

$$\forall w \in W : \forall d \in D : \exists! c \in CC : c(w) = d$$

> 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**

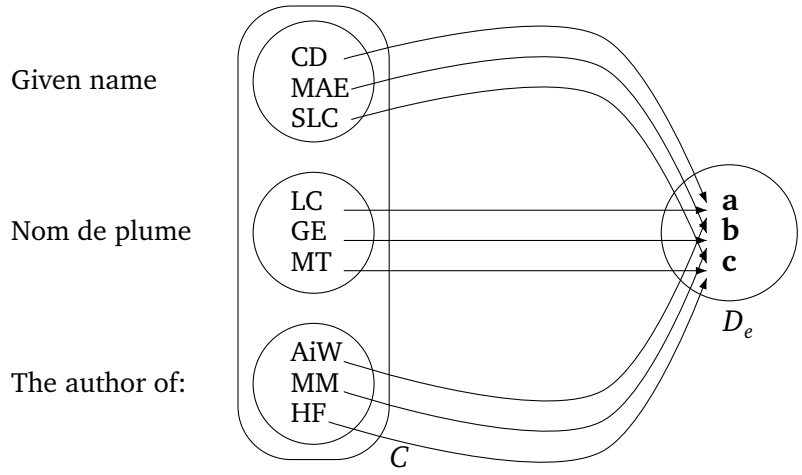

Figure 3: Mapping from conceptual covers in C to D_e

4.3 Concealed Questions under Cover

The proposal: When α, 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?*).

CQ Nominal		**Answer to CQ**		**Identity Question**
the author of AiW	$\Rightarrow$	L. Carrol	$\Rightarrow$	Is L.Carrol the author of AiW in w and w'?
$\langle s, e\rangle$	$\rightarrow$	$\langle s, e\rangle$	$\rightarrow$	$\langle s, \langle s, t\rangle\rangle$

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

($\mathscr{Q}$) Concealed Question Type Shifter

$$\langle s, e\rangle \mapsto \langle \langle s, e\rangle, \langle s, \langle s, t\rangle\rangle\rangle$$
$$\alpha_{\langle s,e\rangle} \mapsto \lambda c_{\langle s,e\rangle}.\lambda w.\lambda w'.c \in CC[c(w) = \alpha(w) \wedge c(w') = \alpha(w')]$$

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

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

The question paraphrase: Given that a noun has shifted to a CQ via $\mathscr{Q}$, 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: $\{\lambda w'.c_1\langle w_0, w'\rangle \doteqdot \alpha\langle w_0, w'\rangle, \ldots, \lambda w'.c_n\langle w_0, w'\rangle \doteqdot \alpha\langle w_0, w'\rangle\}$. The union of these propositions results in a partition of logical space which is identical to that of an ordinary identity question: *What is α?*

(11) **Route to the question paraphrase:**

A. Apply $\mathcal{Q}$ to α. Get CQ: $\lambda c.\lambda w.\lambda w'.[c\langle w,w'\rangle \doteqdot \alpha\langle w,w'\rangle]$

B. Feed a concept c_1 in cover CC_i.
Get propositional concept: $\lambda w.\lambda w'.[c\langle w.w'\rangle \doteqdot \alpha\langle w,w'\rangle]$

C. Feed a reference world w_0. Get a proposition $\lambda w'.[c\langle w_0,w'\rangle \doteqdot \alpha\langle w_0,w'\rangle]$

D. Repeat pointwise throughout CC_i.

E. Take union of propositions. Get a partition identical to regular identity question.

Our example:

(12) [[the author of Alice in Wonderland]] $= \lambda w.\iota x.\text{auth-AiW}(x)(w)$

A. $\mathcal{Q}(\ [[\text{the author of Alice in Wonderland}]]) = \lambda c \in CC.\lambda w.\lambda w'.[c\langle w,w'\rangle \doteqdot \iota x.\text{auth-AiW}(x)\langle w,w'\rangle]$

B. For concept $\lambda w.lc(w)$ in the nom de plume cover:

i. Is Lewis Carrol the author of "Alice in Wonderland"?
$\lambda w.\lambda w'.[lc\langle w,w'\rangle \doteqdot \iota x.\text{auth-AiW}(x)\langle w,w'\rangle]$

ii. Lewis Carrol is the author of "Alice in Wonderland" in w_0
$\lambda w'.[lc\langle w_0,w'\rangle \doteqdot \iota x.\text{auth-AiW}(x)\langle w_0,w'\rangle]$

B′. For concept $\lambda w.ge(w)$ in the nom de plume cover:

i. Is George Eliot the author of "Alice in Wonderland"?
$\lambda w.\lambda w'.[ge\langle w,w'\rangle \doteqdot \iota x.\text{auth-AiW}(x)\langle w,w'\rangle]$

ii. George Eliot is the author of "Alice in Wonderland" in w_0
$\lambda w'.[ge(w_0)(w') \doteqdot \iota x.\text{auth-AiW}(x)(w_0)(w')]$

B″. For concept $\lambda w.mt(w)$ in the nom de plume cover:

i. Is Mark Twain the author of "Alice in Wonderland"?
$\lambda w.\lambda w'.[mt\langle w,w'\rangle \doteqdot \iota x.\text{auth-AiW}(x)\langle w,w'\rangle]$

ii. Mark Twain is the author of "Alice in Wonderland" in w_0
$\lambda w'.[mt\langle w_0,w'\rangle \doteqdot \iota x.\text{auth-AiW}(x)\langle w_0,w'\rangle]$

C. Collect all possible propositional answers via $\cup$.

$\lambda w'.[lc\langle w_0,w'\rangle \doteqdot \iota x.\text{auth-AiW}(x)\langle w_0,w'\rangle]$	L. Carrol is the author of Alice in Wonderland
$\lambda w'.[ge\langle w_0,w'\rangle \doteqdot \iota x.\text{auth-AiW}(x)\langle w_0,w'\rangle]$	G. Eliot is the author of Alice in Wonderland
$\lambda w'.[mt\langle w_0,w'\rangle \doteqdot \iota x.\text{auth-AiW}(x)\langle w_0,w'\rangle]$	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 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.

Conceptualization	**Type**
Relations between individuating concepts and identity Qs	$\langle\langle s, e\rangle, \langle s, \langle s, t\rangle\rangle\rangle$
Set of concepts that individuates CQ NP in pair of worlds $w \times w'$	$\langle s \times s, \langle\langle s, e\rangle, t\rangle\rangle$

Call this set $(\!|c|\!)_{\alpha,w,w'}$: the set of concepts generated by α (the CQ NP) in reference worlds w and w'. This is just the set of concepts that can correctly answer the question "What is α?"

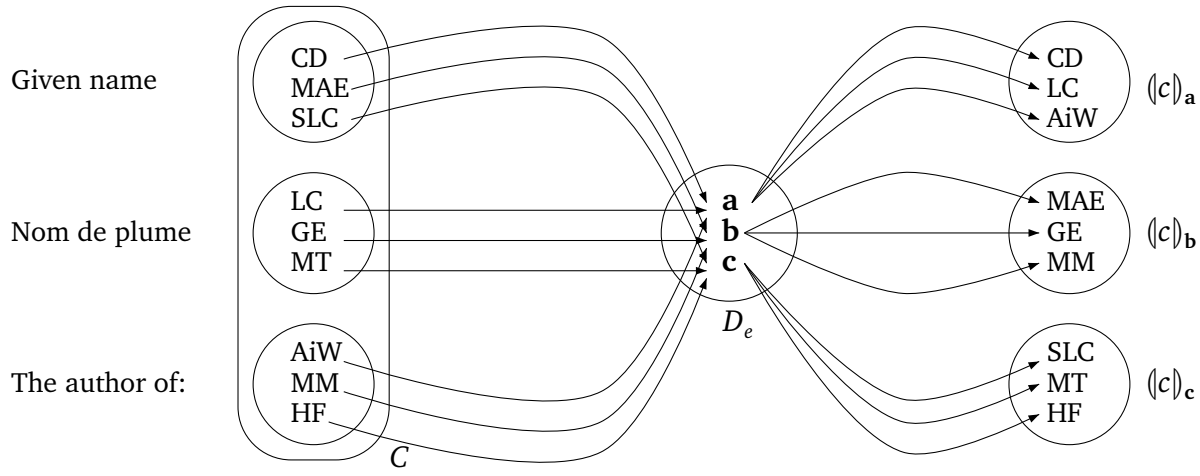

Figure 4: Collecting sets of individuating covers $(\!|c|\!)$

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

Cover	**Concept**	**Extension**
Name	Aaron	Rigidly denotes **a**
	Baron	Rigidly denotes **b**
Description	Most published	Depends on world
	Least published	Depends on world

Worlds	President	Most published	Least Published	Aaron	Baron
$\mathbf{w}_o$	**a**	**a**	b	a	b
w	**a**	**a**	b	a	b
$\mathbf{w}'$	**b**	**b**	a	a	b
w''	b	a	b	a	b

Table 2: Model of extensions in worlds

By description		
$\{w_0, w, w'\}$	$\lambda u.Most\langle w_0, u\rangle \doteqdot Prez\langle w_0, u\rangle$	The president is the most published
$\{w''\}$	$\lambda u.Least\langle w_0, u\rangle \doteqdot Prez\langle w_0, u\rangle$	The president is the least published

By name		
$\{w_o, w\}$	$\lambda u.Aaron\langle w_0, u\rangle \doteqdot Prez\langle w_0, u\rangle$	The president is Aaron
$\{w', w''\}$	$\lambda u.Baron\langle w_0, u\rangle \doteqdot Prez\langle w_0, u\rangle$	The president is Baron

- 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 α in the actual world w_o. 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 $c(w') = \alpha(w') = \mathbf{b}$, despite the fact that $\alpha(w_o) = \mathbf{a}$. That is, worlds in which α denotes a different individual are still included in the paritition.

- **Descriptions:** Possible that c and α denote different objects at w_0 and w'.

$$\begin{array}{lcl} c(w_0) = \alpha(w_0) & \mapsto & \mathbf{a} \\ & & \neq \\ c(w') = \alpha(w') & \mapsto & \mathbf{b} \end{array}$$

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

$$\begin{array}{lcl} c(w_0) = \alpha(w_0) & \mapsto & \mathbf{a} \\ & & = \\ c(w') = \alpha(w') & \mapsto & \mathbf{a} \end{array}$$

Conclusion:

- A novel analysis of concealed questions was presented.
- Allows for flexible answers, within contrained 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 $(\!|c|\!)$ 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

Aloni, M. (2001). *Quantification under Conceptual Covers*. PhD thesis, Universiteit van Amsterdam, Amsterdam, The Netherlands.

Baker, C. L. (1968). *Indirect Questions in English*. PhD thesis, University of Illinois.

Frana, I. (2007). The *de re* analysis of concealed questions. In *Semantics and Linguistic Theory XVI*.

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

Grimshaw, J. (1979). Complement selection and the lexicon. *Linguistic Inquiry*, 10:279 – 326.

Groenendijk, J. and Stokhof, M. (1984). *Studies on the Semantics of Questions and the Pragmatics of Answers*. PhD thesis, Universiteit van Amsterdam, The Netherlands.

Groenendijk, J. and Stokhof, M. (1990). Partitioning logical space. Annotated handout.

Groenendijk, J. and Stokhof, M. (1997). Questions. In van Bentham, J. and ter Meulen, A., editors, *Handbook of Logic and Language*, chapter 19, pages 1055 – 1124. Elsevier Science B.V., Amsterdam, The Netherlands.

Heim, I. (1979). Concealed questions. In Bauerle, R., Egli, U., and von Stechow, A., editors, *Semantics from different points of view*, pages 51 – 60. Springer-Verlag, Berlin.

Nathan, L. (2006). *The Interpretation of Concealed Questions*. PhD thesis, MIT, Cambridge, MA.

Rescher, N. (2005). *Epistemic Logic*. University of Pittsburgh Press, Pittsburgh, PA.

Romero, M. (2004). Intensional noun phrases with *know* and *be*. *Catalan Journal of Linguistics*, 3:147 – 178.

Schönfinkel, M. (1924). Über die Bausteine der mathematischen Logik. *Mathematische Annalen*, 92:305–316.

Schwager, M. (2007). Keeping prices low: An answer to concealed questions. Handout from Sinn and Bedeutung XII, University of Oslo.