THE SYNTAX AND SEMANTICS OF MODIFIED CONCEALED QUESTIONS

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Abstract

In this thesis, I argue for a novel analysis of modified concealed questions (MCQs) largely based on Nathan (2005). Concealed questions are determiner phrases (DPs) that give rise to a question-like meaning when embedded under some question-embedding verbs. MCQs are specifically those DPs that require a modifier, such as a relative clause, in order to give rise to this question-like denotation. In the context of a larger project arguing for a unified account of restrictive relative clauses, free relatives, embedded questions, and concealed questions, this paper presents data showing that MCQs exhibit a series of properties, including the intolerance of an external head and the availability of pair-list readings, which no previous account of concealed questions seems able to explain. To account for these facts, I present a treatment of MCQs as CPs with an internal head and a covert *wh*-determiner, arguing that it correctly captures both the question-like and non-question like properties of MCQs.

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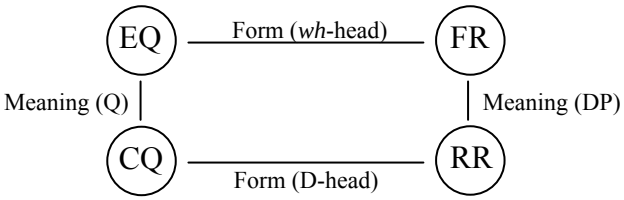
Chapter One: Background and Motivation

1. The Larger Paradigm

Concealed questions, I will argue, are a member of a larger class that consists of restrictive relative clauses (RCs), free relatives (FRs), embedded questions (EQs), and concealed questions (CQs), as in (1):

(1) a. I like what you read this summer — Free Relative
b. I hate the book that you read this summer — Restrictive Relative
c. I wonder what you read this summer — Embedded Question
d. I know the book that you read this summer — Concealed Question

Though parallels between various members of this class have been discussed before, I know of no account that proposes to group all four together. The fundamental intuition for this grouping stems from the fact that, rather than having four distinct forms with four distinct meanings, these four constructions arise from a combination of two forms (*wh*-phrases and complex DPs) and two meanings (entities and questions).



Observe that the entire paradigm can be constructed using two predicates (*borrow*, *know*[1]), and two objects (*the book you bought this summer*, *what book you bought this summer*):

(2) a. I borrowed *the book that you bought this weekend* — Restrictive Relative (RR)
b. I borrowed *what you bought this weekend* — Free Relative (FR)

(3) a. I know *the book that you bought this weekend* — Concealed Question (CQ)
b. I know *what you bought this weekend* — Embedded Question (EQ)

There seems to be a genuine difference in denotation of the object clauses in (2)a,b and (3)a,b respectively. As exemplified in (4), the verb *borrowed* seems to be able to combine only with a DP as its direct object:

(4) a. I borrowed *the book on the table* — DP
b. *I borrowed *what book you put on the table* — * Embedded Question
c. *I borrowed *that you put the book on the table* — *Embedded Proposition

[1] Note that verbs such as *know* and *remember* can have a reading that is closer to a familiar reading:

(a) I know the book very well

(b) I remember the book very well

Additionally, verbs such as *remember* and *forget* have a reading that seems to encode a second VP, e.g. *to bring*

(c) I remembered (to bring) the book

(d) I forgot (to bring) the book

Throughout the paper, unless specifically stated, I will be ignoring these readings.

This suggests that in (2), both *the book that you bought this weekend* and *what you read this weekend* are genuine DPs.

However, in (5), we see that *know* in the intended (non-familiar) reading is not able to combine with an object DP, but rather an embedded clause, combining both with embedded propositions and embedded questions:

(5) a. #I know *the book on the table* #DP
b. I know *what book you put on the table* Embedded Question
c. I know *that you put the book on the table* Embedded Proposition

This suggests that in (3), *the book that you bought this weekend* and *what you bought this weekend* are not DPs, but clausal complements. Thus it seems that there is a genuine ambiguity for (6) and (7): each can behave as a DP and as a full clause (CP), which can be paraphrased loosely as below:

(6) [[the book that you bought this weekend]] =
a. The book that has the property of being bought-by-you
b. What book is such that it has the property of being bought-by-you?

(7) [[what you bought this weekend]] =
a. The item that has the property of being-bought-by-you
b. What item has the property of being bought-by-you?

Large bodies of work have been done on the syntax and semantics of restrictive relative clauses (c.f. Verguend 1974, Chomsky 1976, Kayne 1994, Safir 1999, Sauerland 2002) and embedded questions (see Karttunen 1977, Grimshaw 1979, Heim 1994, Lahiri 2002, etc). Additionally, specific analyses have been proposed to account for concealed questions and free relatives, offering an explanation of the unexpectedness of DPs getting clausal denotations and clauses getting the denotation of a DP. A number of operators have been proposed to shift DP (type e) and NP denotations (type ⟨e,t⟩) into propositional (type ⟨s,t⟩) and question (type ⟨s,⟨s,t⟩⟩) denotations, accounting for the behavior of concealed questions, including Nathan (2004, 2005) who proposes a type shifting operator, and Romero (2005), who treats these objects as individual concepts (⟨s,e⟩). An equally large set of proposals has been made to account for clauses that act like entities (free relatives), including Jacobson (1995) and Caponigro (2001), who propose a maximality operator over sets to pick out individuals. Though many of these theories are able to capture the facts about each local phenomenon, little or no work has been done on finding a unifying account of these structures, despite the fact that they seem to be systematic variations of the same structure.[2]

[2] I recently discovered work by Caponigro and Polinsky (2008a, b) exploring Adyghe, a West Circassian language. They argue that Adyghe uses one basic form (the "mystery clause") to express what other languages have (seemingly) separate forms for: headed relative clauses, free relative clauses, embedded constituent questions, embedded polar questions, and embedded declaratives. They analyze this mystery clause as a basic relative clause, which can relativize either over arguments (entities) or polarity operators.

They argue this RC can, using operators already in the language, be mapped into all five meanings, capturing the DP-like and clause-like properties of these objects. Because of some of the properties of the language (e.g. not allowing any embedded clauses at all), this analysis cannot be extended immediately to other languages, which allow for both DP and CP embedded objects. Caponigro and Polinksy do not discuss extending this analysis to other languages, treating Adyghe as an anomaly; however, I take this as evidence that there is a non-trivial connection between the constructions that I am exploring.

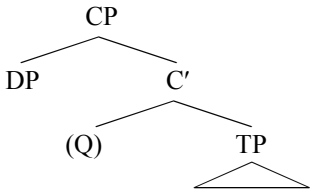
2. An Outline of a Unified Analysis

The overarching goal of this project is to provide a unified treatment for these four constructions. One of the key observations for motivating a unified account is that the differences between these four constructions can be defined using two parameters: whether the object has a question denotation (which I currently assume indicates a *wh*-operator) and whether it contains a *wh*-word. Note that the four constructions under consideration fully fill out the paradigm:

Clause	***wh*-operator**	***wh*-word**
free relatives	×	✓
restrictive relatives	×	×
embedded questions	✓	✓
concealed questions	✓	×

In order to provide a unified account that captures these systematic variations, I hope to define a core structure that allows these two parameters to vary, giving rise to each of the four constructions. Starting from the fact that all of these constructions seem to contain a CP, I use (8) as the basis for defining the core structure:

(8)



Note that (8) has properties not always assumed for CPs. Specifically, I will argue that the DP can be [±wh], and the Q-operator is optional. Note that this makes a non-trivial assumption – I am decoupling the link between a *wh*-word and a question operator, arguing that there can be Q-operators that are licensed without a *wh*-word, and *wh*-words that do not require question operators. Moreover, it assumes that a full DP, not an NP, sits in Spec-CP.

In addition to treating (8) as the underlying skeleton of these forms, I will consider the semantics and distribution of the external heads that can combine with these CPs, DP-embedding and question-embedding verbs, and possible type-shifting and/or speech-act operators (e.g. answer operators). The goal will be to account for the available meaning and distribution of restrictive relatives, free relatives, embedded questions, and concealed questions based on the semantics of these verbs and operators. In order to achieve a complete analysis along these lines, a number of steps need to be taken, including achieving an in-depth understanding of each of these constructions. This paper is the first of these steps, focusing on concealed questions.

Specifically, I will argue that the evidence presented in this paper supports the above intuition: modified concealed questions seem to be CPs that have the internal structure of an embedded question without a question operator. Instead, I argue that they receive their question-like denotation from a covert wh_{CQ} head attached to the head NP. In the next chapter, I discuss the current proposals of concealed questions in the literature and the empirical predictions they make. In Chapter 3, I explore the syntax and semantics of concealed questions, arguing that current analyses do not seem to capture the full range of facts. Instead, it seems that modified concealed questions do have the properties predicted by (8) – specifically, they behave syntactically like CPs, with the "head-NP" being a DP that has moved from a base position to SpecCP, with the internal semantic properties of *wh*-questions, but without the properties generated by an embedded question operator. In Chapter 4, I propose a modified analysis or MCQs, based in part on the account put forward in Nathan (2005), in which a covert concealed question determiner, wh_{CQ} combines with the in-situ head NP, and then moves to Spec-CP.

(9) $[_{CQ}\text{the}_{prop}\ [_{CP}\ [_{DP}\ \text{wh}_{CQ}\ \text{book}]_7\ [_{TP}\ \text{that John read}\ t_7]]]$ $\langle s,t\rangle$

(10) $[[\text{wh}_{CQ}]] = \lambda Q_{s,et}.\ \lambda P_{s,et}.\ \lambda p_{st}\ .\ [\exists x_e\ .\ p = \lambda w\ .\ [P(w)(x)\ \&\ Q(w)(x)]]$ $\langle\langle se, t\rangle, \langle set,\langle st, t\rangle\rangle\rangle$

I argue that this analysis correctly captures the empirical facts about modified concealed questions without additional stipulation or undue machinery, and provides the first step into a deeper understanding of concealed questions, embedded questions, relative clauses, and free relatives.

Chapter Two: Concealed Questions

In some ways, concealed questions are the most unexpected of the four constructions discussed above – while it is possible to think that a more complex denotation (e.g. a proposition or question) could be simplified into one of its components (e.g. the subject or object DP as in free relatives), it is not clear how the semantics can take what seems to be a simple object and create a more complex meaning without adding extra information ad hoc.

In this chapter, I give a brief sketch of ways of analyzing concealed questions following primarily Nathan (2005), who includes an extensive summary of these analyses. On the face of it, concealed questions are puzzling because their surface appearance is that of a DP while their semantic contribution seems to be that of a *wh*-clause. This mismatch was first discussed extensively in the syntactic literature, in the context of whether c-selection can be reduced to s-selection (Grimshaw 1979, Pesetsky 1981). On the semantic side, concealed questions have been studied both in terms of their relationship to embedded questions and to individual concepts (e.g. Heim 1979, Romero 2005). A recent development in the semantics of concealed questions comes from Nathan (2005). I will be focusing primarily on this work due to the distinction it draws between functional and modified concealed questions, giving the only analysis of which I am aware for modified concealed questions in particular. I will argue that modified concealed questions need to be looked at as a separate class from functional concealed questions, and layout some of the predictions of Nathan's analysis for modified concealed questions.

1. Concealed Questions as Questions

Following a Hamblin (1973) style approach to questions, questions denote sets of propositions that are answers to the question, and propositions denote sets of possible worlds that support the proposition. Karttunen (1977) uses a very similar approach, but limits the set of answers to the set of true answers, a distinction I will set aside for the moment. The denotation of a question can be given as a list of possible answers, as in (11); it can also be described as a function, as in (12)a or as a set, as in (12)b.

(11) [[Who is the governor of California]] =
{that Arnold Schwarzenegger is the governor of California,
that Bill Richardson is the governor of California,
that Deval Patrick is the governor of California, …}

(12) [[Who is the governor of California]] =
a. $\lambda p.\ [\exists x.\ p = \lambda w.\ [x \text{ is the governor of CA in } w]$
b. $\{p: \exists x.\ p = \lambda w.\ [x \text{ is the governor of CA in } w]\}$
the set of propositions for which there exists an individual such that the form of the proposition is *that individual is the governor of California*

There is a general intuition that a concealed question is somehow very close to the counterpart embedded identity question, as in (13). From this, the most straightforward way of analyzing concealed questions is to treat them as questions that are derived from a DP denotation, using a type-shifting rule along the lines of the one in (14), which takes in the intension of an individual, and returns the set of propositions that, for an individual y, have the form *that y is x*.

(13) a. I know the governor of California.
b. I know who the governor of California is

(14) $\lambda x_{se}\ .\ \lambda p_{st}\ .\ [\exists y_{e}\ .\ p = \lambda w_{1}\ .\ y \text{ is x in } w]$ $\langle s, e\rangle \rightarrow \langle st, t\rangle$

Applying this type shifting rule to the intension of the DP *the governor of California* gives rise to a set of propositions identical to the denotation of the identity question *who is the governor of California,* as in (15).

(15) $[[\text{the governor of CA}]]_{CQ}$
$= \lambda p.\ [\exists x.\ p = \lambda w.\ [x \text{ is the governor of CA in } w]$
$=$ *who is the governor of CA*

However a solution along these lines makes two problematic predictions. First, it does not correctly capture the distribution of DPs that can serve as concealed questions – it either predicts that any DP should be able to serve as a concealed question, or it predicts that only DPs that are inherently intensional (type ⟨s,e⟩) can become concealed questions. However, not all DPs can, on their own, give rise to concealed questions denotations as can be seen in (16). Moreover, DPs like *the book*, for which the NP portion is an extensional noun, can give rise to concealed questions when properly modified as in (17), indicating that the predictions made by (14) are either too strong or too weak.

(16) *I know the book.
(17) I know that book that you read.

Second, a theory that treats concealed questions as derived questions also predicts that any question-embedding verb should be able to combine with a concealed question. Again, this is not the case, as can be seen in the unacceptability of (18).

(18) a. I wonder who the governor of California is.
b. *I wonder the governor of California.

Based on distributional facts of this sort, Grimshaw (1979) argues for the Autonomy Thesis, which states that c-selection and s-selection are independent properties of the grammar. Treating these selection properties as lexically specified, she accounts for the distribution of concealed questions by arguing that those predicates that s-select for a question denotation and c-select for a DP object can embed concealed questions. She accounts for the *wonder*-class by treating them as predicates that s-select for questions and c-select for CPs but not DPs.

However, this theory over-generates, suggesting the existence of a class of predicates that can embed *only* concealed questions (s-selecting for a question, c-selecting for a DP and not CP). This class is completely unattested, (19):

(19)

c-selection	**s-selection**	**verb**
[_CP, DP]	<__Q>	*know*
[_CP]	<__Q>	*wonder*
[_DP]	<__Q >	???

In response to the Autonomy Thesis and its problems, Pesetsky (1981) tried to eliminate the need for c-selection, arguing that the lack of "concealed questions only" verbs is related to differences in case assigning properties across various verb classes. He argues that semantic forms have 'canonical structural realizations,' and that if a predicate s-selects for a given semantic form, it must c-select for its canonical structural realization. Arguing that for propositions, interrogatives and exclamatives, the canonical structural realization is a CP, any predicate which s-selects for a question or proposition must be able to combine with a CP. This then accurately predicts that predicates which embed only question-DPs are unattested. However, it does not explain the difference between predicates like *know,* which embed both CPs and DPs, and those like *wonder*, which embed only CPs.

Pesetsky proposes that Case Theory can account for this distribution. Extending the notion of quirky case to include necessary null case ([+Ø-case]), any predicate that requires a caseless object cannot combine with a DP object

(which needs to be assigned case), but can combine with a CP (which doesn't). Pesetsky argues that this accounts for the distribution of question embedding verbs:

(20)

Case	**s-selection**	**verb**
default	<__Q>	*know*
[+Ø-case]	<__Q>	*wonder*

However, this still does not seem to get the distributional facts entirely correct. If *wonder* assigns null case, then it should not allow any DP object. However, Nathan (2005) argues that verbs in the *wonder*-class can in fact take DP arguments, as long as they are standing in for questions, as in (21):

(21) a. Kim wondered who left, and Sandy wondered *that* as well.
b. Kim wondered who left, and Sandy wondered *the same thing*.

It seems that treating concealed questions semantically as questions, modulated by syntactic constraints, is not a viable way to capture their distributional facts.

2. Concealed Questions as Individual Concepts[3]

Another, more semantic, approach is to treat concealed questions as individual concepts (ICs), which are functions from worlds and times to entities (Heim 1979, Romero 2005). The existence of these types of meanings is independently motivated by a class of predicates such as *rising* which seems to require a set of world-individual pairs, rather than a set of individuals (e.g. *the temperature is rising*). There are two ways to give a DP an individual concept meaning: first, by following Montague's system of treating certain NPs as objects of type ⟨se,t⟩ (the intensions of sets of individuals)[4], or second, following Romero by intensionalizing the denotation of an entity, going from type e to type ⟨s,e⟩.

Heim (1979) raises two main issues with the Montagovian solution. She first notes that the class of NPs than can serve as ICs can be extraordinarily large and that the theory seems to ignore systematic difference between bare nouns and modified nouns (e.g. *the book* vs. *John's favorite book*). Second, she observes an ambiguity in sentences like (22), which can either have a meaning along the lines of (a) or (b):

(22) John knows the price that Bill knows.
a. John and Bill know the same price (but might not know that the other knows it)
b. John knows which price Bill knows (but might not know the actual price)

In order to account for this ambiguity (and the fact that they are infinitely embeddable – *John knows the price known to Fred that Bill knows*) in an IC theory, Heim argues that the lexicon would have to have infinitely many versions of a single CQ embedding predicate such as *know* which are not simply cross-categorical versions of each other, but rather have different truth conditions.

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[3] This type of proposal is the least relevant to the purpose of this paper, and rather than laying out the full extent of the proposal, I direct the reader to both Heim (1979) and Romero (2005), as well as Chapter 3 of Nathan (2005), who provides a extensive discussion of what I summarize briefly here.

[4] Montague actually treated all nouns as type ⟨se, t⟩ but provided a meaning postulate that stated that for all non-IC nouns, all of the world and time indices mapped to the same individual. In this theory, the distinction then is between nouns that meet this meaning postulate and those that don't.

The second type of solution, argued for by Lasersohn (2005) and Romero (2005) seems to capture the distributional facts for predicates that take ICs such as *rising*. However, this theory specifically lays out that any definite description with a free world-variable should be able to become an individual concept, which would predict that nearly any DP can be a concealed question, which is not the case. A solution that treats concealed questions as individual concepts seems to be subject to many of the same issues that the syntactic solutions were, suggesting that this also iS not an empirically adequate solution to concealed questions.

3. An Alternative Account: Nathan 2005

All of the above propositions seem to run into two issues regarding the distributional facts about concealed questions: which predicates can embed CQs, and which DPs can serve as CQs?

To address their external distribution, Nathan (2005) argues for a semantic generalization about the type of verbs that can embed concealed questions. Specifically, he puts forth the generalization in (23). The primary motivation for this is the fact that, even though CQs can be faithfully paraphrased using questions, they cannot be embedded under all question-embedding verbs. Only those that can also embed propositions can combine with CQs.

(23) Proposition/CQ Correlation (PCQC): Nathan 2005, page 54

> For a Case-assigning argument position that allows questions, propositions and concealed questions have the same distribution.

This accounts for the difference in distribution of the *know* class of predicates and the *wonder* class[5]: *know* can embed both questions and propositions, and thus can embed concealed questions, (24), while *wonder* can embed only questions, and thus cannot embed concealed questions, (25).

(24) a. John knows who the governor of California is
b. John knows that the governor of California is Arnold Schwarzenegger
c. John knows the governor of California

(25) a. John wonders who the governor of California is
b. *John wonders that the governor of California is Arnold Schwarzenegger
c. *John wonders the governor of California

Based on this generalization, Nathan argues that, rather than denoting questions, concealed questions denote identity propositions, (26).

(26) Nathan's Meaning of Concealed Questions: Nathan 2005, page 18
$[[\textit{the NP}]] = \iota p_{st} . [[\exists x_e . p = \lambda w_1 . [[NP]]^{w1} (x)] \,\&\, C(p)]$

That is, *the NP* denotes the unique (maximal) proposition such that
(a) for some individual *x*, the proposition is the set of worlds such that *NP* is true of *x* in that world, and
(b) the proposition meets a contextual restriction *C* (most often, the restriction is that the proposition is true) [6]

[5] Nathan notes a series of seeming exceptions to this generalization, such as *ask* and *care*. He uses the first part of his generalization (a case requirement modeled on Pesetsky's) to account for some of these, and argues that others show other anomalies suggesting they are somehow not part of the same class of question embedded verbs. For the discussion of his analysis, I will put these exceptions aside; however they will need to be accounted for in any new approach to CQs.

This assigns an identity proposition of type ⟨s,t⟩ to the meaning for a concealed question like *the governor of California*:

(27) [[the governor of CA]] =
the unique proposition such that, for some x, the proposition expresses that x is the governor of CA.

This gives rise to the final meaning of *John knows the governor of California* in (28):

(28) [[John knows the governor of CA]] =
$\forall w\ [Dox_{john}(w)(w_0) \rightarrow p(w) = 1$, where $p = \iota\{p: \exists x.\ p = \lambda w_1\ .$ x is the governor of CA in w$\}]$

For all worlds, if compatible with what John knows in w_0, then the proposition *p* is true in that world, where there is an individual such that *p* is the unique proposition of the form *that the individual is the governor of California* (and the proposition is true in this world).

Treating concealed questions as identity propositions, rather than identity questions, seems to account for the external distributional facts laid out in PCQC – under this theory, if a predicate cannot embed a proposition, it clearly cannot embed a concealed question.

3.1 Functional and Modified Concealed Questions

Giving concealed questions a propositional treatment immediately raises the question of what the internal composition of a concealed question is such that it can give rise to a propositional meaning. To address this question, Nathan argues that the NP, rather than denoting a set of entities, denotes a set of identity propositions[7], while the determiner denotes a maximality operator over this set of propositions.

(29) $[[NP_{CQ}]] = \{p_{\langle st\rangle}: \exists x.\ p =$ that [[NP]] is true of x$\}$
(30) $[[the_{prop}]]_{\langle\langle st,t,\rangle\ st\rangle} = \lambda\mathcal{P}_{\langle st,t\rangle}\ .\ \iota p_{st}.\ \mathcal{P}(p)$

Before discussing the further semantic decomposition of these NPs, Nathan observes that there are two types of NPs that can serve as concealed questions. Specifically, an NP can be a concealed question if:

(a) the head noun is functional: it expresses a relationship between two individuals (e.g. a state and its governor, a commodity and its price), or
(b) the head noun is non-relational but the NP is modified in a certain way (e.g. with a relative clause)

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[6] For the sake of readability and ease of exposition, and because it is not essential to my purpose, I exclude the contextual portion of the definition for the rest of the discussion of Nathan's proposal.

[7] Note that this is identical to the denotation of an identity question (*what/who is the NP?*). Although this semantically encodes the closeness of a concealed question and a question, it seems to make a bad prediction: any verb than can embed concealed questions should be able to embed a "bare" CQ, which is clearly out:

(i) *I wonder book that John read this summer

It is possible that structures like this can be ruled out with something along the lines of a case constraint on the argument position of the embedding verb, though I know of no discussions along these lines currently.

The first class, functional concealed questions, do not require any modification to have a concealed question meaning, and consists of a relatively small number of DPs (e.g. *capital, price, name, governor…*). The second class, on the other hand, consists of any NP that has the proper modification[8].

(31) a. John predicted *the price of gas*
b. John predicted *the price of gas that Chevron (but not Shell) set*

(32) a. *John predicted *the book (about gas)*
b John predicted *the book (about gas) that Mary read this summer*

Nathan observes that modified concealed questions (MCQs) and functional concealed questions (FCQs) require different internal compositions – functional concealed questions seem to have a property inherent in the NP itself that allows for a concealed question meaning, while modified concealed questions seem to be concealed questions because of a property of the modifier, not the NP itself. However, he does assume that, post composition, functional concealed questions and modified concealed questions have the same external semantic type (a proposition) and distributional properties. However, it seems that modified concealed questions behave in systematically different ways than functional concealed questions, indicating that as well as having different internal properties, MCQs and FCQs also have different external properties.

The first indicator of different external semantics is the fact that modified concealed questions and functional concealed questions do not seem to elicit identical embedded questions paraphrases. Nathan (2005) argues that the correct paraphrase of a concealed question of form *the X* is an identity question in the form of *what the X is* or *who the X is,* (33)a. However, for modified DPs of the form *the X*, there is another paraphrase that seems to be systematically available, *what X,* (33)b.

(33) I am curious as to the book that you read over the summer
a. I am curious as to *what the book that you read over the summer is*
b. I am curious as to *what book you read over the summer*

In fact, (33)b seems intuitively to be a much more natural paraphrase for the original CQ. MCQs in general seem to be more well paraphrased using *what X*, while *what the X is* does not sound quite correct, (34), (36). This contrasts noticeably with the functional DPs, which allows only the *what the X is* paraphrase, (35), (37)[9, 10]

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[8] Nathan's list of possible modifiers includes relative clauses, superlatives, and post nominal adjectives. Here I will focus on (as Nathan's analysis does) only those modified by a relative clause. Analyses have been given to both post-nominal adjectives and superlatives as something close to a relative clause structure, which suggests that these modifiers might share the same basic properties that allow the relative clause to give rise to the CQ meaning.

[9] Quantified concealed questions (concealed question with a quantificational head) seem in general hard to paraphrase using the *what every X is* paraphrase, though it is possibly somewhat better for functional concealed questions than for modified ones:

(i) John knows every book that Mary read MCQ
a. ??John knows what every book that Mary read is
b. John knows what books Mary read

(ii) John knows every state capital FCQ
a. John knows what every state capital is
b. *John knows what state capitals

[10] In the *what X* paraphrases, the complementizer *that* needs to be dropped (which may indicate a relationship between the complementizer and the spelled-out *wh* word):

* I am curious as to which book that you are reading

(34) I am curious as to the book (that) you are reading MCQ
a. ??what the book that you are reading is
b. what book you are reading

(35) I am curious as to the capital of California FCQ
a. what the capital of California is
b. *what capital of California

(36) I am curious as to the capital that had the least crime MCQ
a. ??what the capital that had the least crime is
b. what/which capital had the least crime

(37) I am curious as to the capital of California FCQ
a. what/which the capital with the least crime is
b. *what/which capital with the least crime

Additionally, MCQs and FCQs don't have quite the same external distribution. Specifically, some concealed question embedding predicates that allow functional CQs do not allow modified CQs. Taking (38) as a baseline, the modified concealed questions are noticeably worse for some of the CQ-taking verbs:

(38) John knew
a. the current price of milk
b. the book that Sue was reading

(39) John asked[11]
a. the current price of milk
b. *the book that Sue was reading

(40) John found out/was convinced of/was certain of
a. the current price of milk
b. ??the book that Sue was reading

Moreover, it seems that functional and modified concealed questions have different binding properties. Modified CQs allow for binders inside the clause to bind variables in the DP head of the CQ, while functional CQs do not. I include the minimally different *wh*-paraphrases, which in general allow binding of this sort, as a baseline.

The data in (41) suggest that the variable *his house* can be bound by the binder *every man* inside the relative clause in the modified concealed question construction. This parallels the embedded question paraphrase. However, (42) shows that functional concealed questions do not have the same distribution as MCQs and embedded questions – they do not allow *every seller* to bind the pronoun *his*. This suggests that MCQs and FCQs have fundamental syntactic differences. (See section 2 of chapter two for a more in-depth explanation of this construction.)

(41) a. Mary is curious as to the room in his house$_i$ that every man$_i$ works in Binding
b. Mary is curious as to what room in his house$_i$ every man$_i$ works in Binding

(42) a. *Mary is curious as to the price of his house$_i$ that every seller$_i$ set No Binding
b Mary is curious as to what the price of his house$_i$ that every seller$_i$ set is Binding

[11] Nathan argues that *ask* is not a genuine concealed question embedding verb in order to explain why it does not embed propositions, which is a violation of PCQC. However, the other verbs, as far as I know, are treated as standard CQ/proposition embedding verbs.

Finally, one of the standard puzzles of concealed questions, Heim's paradox seems to have different properties in FCQ constructions and MCQ constructions. Specifically, Heim (1979) observes that sentences like (43) give rise to two possible meanings. Note that the CQ is a relational noun[12].

(43) John is curious as to the price that Bill is curious as to.
  a. John and Bill are curious as to the same price (but might not be curious as to that the other is curious)
  b. John is curious as to which price Bill is curious as to (but might not be curious as to the actual price)

However, when the relational noun is replaced with a modified noun, the first reading disappears, which is highly unexpected under a unified account of these CQs[13].

(44) John is curious as to the book that Bill is curious as to[14]
  a. ??John and Bill are curious as to the same book (but might not be curious as to that the other is curious)
  b. John is curious as to which book Bill is curious as to (but might not be curious as to the actual book)

These facts indicate that modified concealed questions need to be given a treatment fully independent of functional concealed questions. MCQs have a different relationship to *wh*-questions, a different distribution, different syntax, and different scope-properties than FCQs. Because of this, I set aside functional concealed questions for the remainder of the paper, and focus solely on modified concealed questions. If FCQs and MCQs are underlyingly different objects, as their form and distribution suggests, functional concealed questions do not seem to be part of the paradigm I am exploring.

3.2 The Internal Composition of Modified Concealed Questions

The relevant compositional difference between FCQs and MCQs is whether the NP portion or the modifier portion of the CQ drives the availability of the concealed question meaning. In order to stay within the focus of the paper, I exclude the specifics of Nathan's analysis of functional concealed questions, which relies on the fact that functional nouns are of type ⟨e,et⟩. The property that gives rise to modified concealed questions cannot be a property of the NP itself; since modified NPs, but not bare NPs, can serve as CQs, Nathan observes that there must be some relevant semantic distinction between the two. Noting that it is non-trivial to design a semantics that would be sensitive to this difference at the NP level, he instead argues that the modification structure itself provides the necessary type shift. Specifically, he argues that a standard relative clause can have two denotations:

(45) [[that John read this summer]] =
  a. λx_e . John read x this summer — DP modifier
  b. $\lambda P_{\langle s,et\rangle}. \lambda p_{\langle st\rangle}$. $[\exists x_e$. p = λw . [P(w)(x) & John read x this summer in w]] — CQ modifier

When combined with the head noun, *book*, the relative clause can denote the set of propositions which, for some *x*, express that *x* is a book and that John read *x* this summer, in (46).

---

[12] I use the verb *curious as to*, not *know* (as was in Heim's original sentences) because my informants had a particularly hard time ignoring the 'familiar with' reading in these constructions.

[13] For general availability of stacked RCs, see (i):

(i) John is curious as to the book that Mary read that Bill recommended

[14] This is on face predicted to be ungrammatical, as the ellipsis resolution would result in …*Bill is curious as to the book*, which is bad for the independent reason that the DP is not longer modified. That (44) is not immediately ungrammatical needs to be considered.

(46) [[book that John read this summer]] =
λp_{st} . [$\exists x_e$. p = λw . [x is a book in w & John read x this summer in w]]

This applied to his maximality operator the_{prop} gives rise to the expected propositional denotation:

(47) [[the book that John read this summer]] =
ιp_{st} . [$\exists x_e$. p = λw. [x is a book in w & John read x this summer in w]]

To derive the CQ meaning of a relative clause, Nathan proposes that the relative clause undergoes type-shifting, using an operator along the lines of the one in (48). This type-shifting operator acts as a sort of "propositional predicate modification," mapping two properties (intensions of predicates) into a set of propositions.

(48) $[[Op_{CQ}]] = \lambda Q_{s,et}. \lambda P_{s,et}. \lambda p_{st} . [[\exists x_e . p = \lambda w . [P(w)(x) \& Q(w)(x)]]$ $\langle se, t\rangle \rightarrow \langle set,\langle st, t\rangle\rangle \rightarrow \langle st,t\rangle$

Thus, Nathan argues that modified concealed questions are simply relative clauses that have undergone type shifting.

3.3 Implications of Nathan 2005's treatment of MCQs

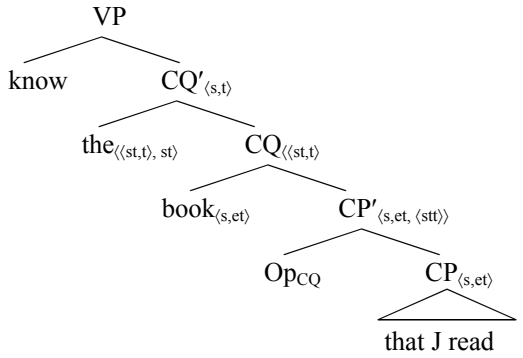
Nathan (2005) makes no explicit syntactic commitments to the structure of modified concealed questions; however, his proposed semantics has necessarily some important structural implications.

First, his propositional predicate modification requires two distinct pieces: the head NP *book* and the RC *that you read last summer*. As Nathan points out, the semantics need to account for the fact that modified, but not bare NPs, can be MCQs. In order to build this in compositionally, Nathan's type-shifting operator in (48) cannot be recast to take only a single argument – with standard semantic tools, the difference between a "more complex" object of type ⟨e,t⟩ and a bare ⟨e,t⟩ object is opaque at the NP level. Thus Nathan seems to be semantically committed to keeping the head NP and the relative clause separate.

This makes a strong syntactic prediction: only relative clauses with a distinct external head should be able to become MCQs. This entails a structure that looks similar to the following (assuming that the type shifting operator is encoded by an object-language expression, Op_{CQ}[15]):

(49) …know the book that John read

(49′)



[15] Note that this assumption isn't necessary for either Nathan's analysis or my criticisms of his analysis – it is used simply to clarify the structures in question.

These semantic and syntactic requirements give Nathan's analysis certain structural commitments. Specifically, his assumed semantics and the associated syntax require a relative clause that is externally headed, and is thus incompatible with a raising analysis. However, in the next chapter I will argue that this makes exactly the wrong prediction: modified concealed questions seem to be necessarily raising relative clauses, and do not tolerate any sort of external copy of the head NP.

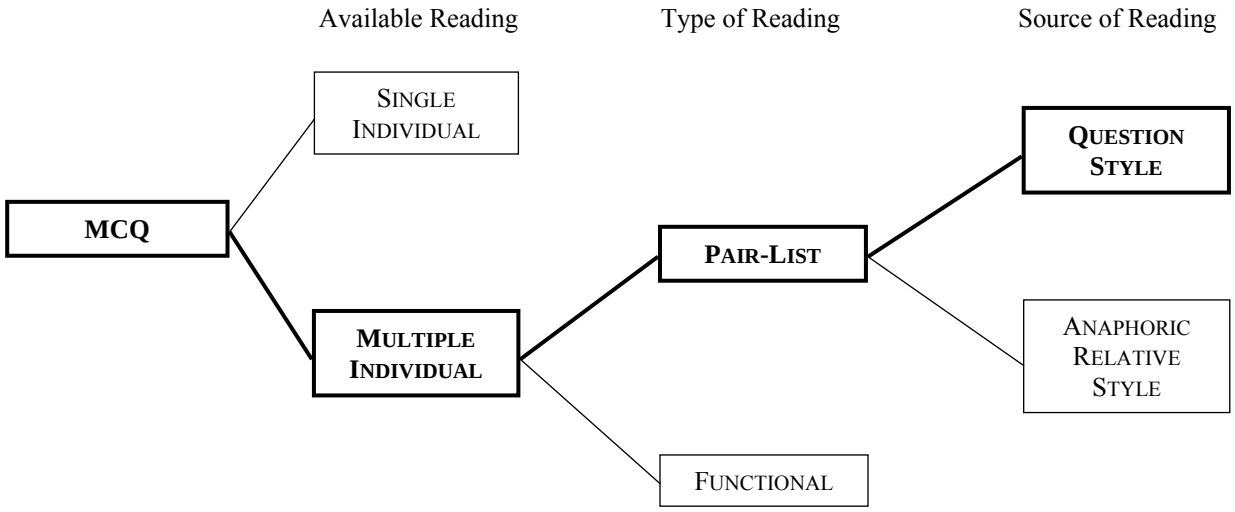
Second, Nathan's treatment of MCQs as a type-shifted relative clause entails that the modifying part of the NP is just a relative clause, and should have the syntactic and semantic properties of a relative clause, without the additional question-like properties of embedded questions. However, in the next chapter, I will argue that this also appears to be incorrect: modified concealed questions give rise to pair-list readings that only seem available to question-like structures, not relative clauses.

Chapter Three: Properties of Modified CQ

This section presents empirical arguments that put Nathan's (2005) analysis of MCQs into question: I show first that modified concealed questions give rise to pair-list readings in the same way that embedded questions do, indicating that MCQs have an internal composition similar to that of genuine questions, and second that the syntactic properties of MCQs resemble those of raising relative clauses, indicating the MCQs do not have any sort of external NP head.

1. Pair-List readings

In this section, I argue that modified concealed questions must share some fundamental architecture with questions and embedded questions. Making, as far as I know, a novel observation about the availability of multiple-individual readings in modified concealed questions, I argue that MCQs give rise to a pair-list reading in the same way that questions do. The argument consists of three parts schematized below: First, I show that MCQs give rise to multiple individual readings, second that one of the multiple-individual readings is a genuine pair-list reading (and not the by-product of a functional reading), and third, that the pair-list reading is identical to the pair-list reading generated by a question (the path of the modified concealed question is marked in bold).



1.1 The Multiple Individual Reading

Modified concealed questions give rise to an ambiguity in reading that normal restrictive relatives do not. Specifically, when relativizing the object, they allow a multiple individual reading for the relative clause head *the woman*, in (50).[16]

(50) I'm curious as to the woman that every man loves
  a. I am curious as to the one woman that is loved by all the men Single Individual

[16] This contrast holds for various determiners in the RC head, a fact which I will return to shortly:

(i) I'm curious as to more than half of the books that every boy read CQ: Multiple Individual

(ii) I sold more than half of the books that every boy read RR: *Multiple Individual

b. I am curious as to each woman that each man loves — Multiple Individual

Note that the minimally different restrictive relative does not give rise to this ambiguity.[17, 18]

(51) I saw the woman that every man loves.
a. I saw the one woman that is loved by all the men — Single Individual
b. *I saw each woman that each man loves — *Multiple Individual

This "multiple woman" reading seems strongly reminiscent of the multiple individual readings found in questions and embedded questions, (52).

(52) I'm curious as to which woman every man loves.
a. I am curious as to the one woman that is loved by all the men — Single Individual
b. I am curious as to each woman that each man loves — Multiple Individual

In the remainder of this section, I will show that the multiple individual readings generated by questions and concealed questions are, in fact, the same. I will argue that, with respect to multiple individual readings, MCQs pattern exactly with questions, and against any other construction that gives rise to multiple individual readings.

It has been widely observed (Chierchia 1993, Sharvit 1999, Aoun & Li 2003) that for questions involving a *wh*-object and a universally-quantified subject, the multiple individual reading is ambiguous between a functional reading and a pair-list reading. Though both give rise to similar entailments (namely that the answer consists of multiple individuals), they are actually quite distinct in the form of the answer they elicit, as in (53).

(53) Which woman does every man love?
a. Every man loves Marilyn Monroe — Single Individual
b. Every man loves his mother — Functional
c. John loves Mary, Bill loves Sue, Dave loves Kate,… — Pair-List

The functional question readings are generally analyzed by assuming that there is a functional operator intervening between the *wh*-word and the embedded quantifier, that maps men to women (e.g. f(x) = x's mother), (Engdahl 1985, Chierchia 1993). For the pair-list reading, various analyses have been given, including lifting the quantifier out of the question (Karttunen 1977) and letting it quantify over question types, treating the quantifier as a domain restrictor (Groenendijk and Stokhof 1984), treating the pair-list readings as a special case of the functional reading (Chierchia 1993), a combination of lifting, domain restriction, and standard quantification (Szabolcsi 1997), and scope taking over speech-acts (Krifka 2001). Until presenting my final analysis of concealed questions, I will

[17] Some authors do not agree with this fact (c.f. Simík, 2008), arguing that *that*-RCs can get an inverse scope reading. However, neither I nor my informants (nor most authors that have worked on pair-list readings) were able to get these judgments; and many of the test sentences offered in Simík seemed to involve modals, which could affect scope in ways not related to the relative clause.

Additionally, there does seem to be a certain sub-class of relative clauses that do allow this inverse scope reading, which I will discuss subsequently (see Sharvit 1999 and Hulsey&Sauerland 2006).

[18] We see that the lack of ambiguity in restrictive relatives is also reflected in free relatives:

(i) I sell what every boy recommended
a. I sell the item that all of the boys recommended
b. *I sell each item that a boy recommended

remain uncommitted to any of these solutions; though the tests offered below do seem to indicate a non-trivial difference between the pair-list reading and the functional reading.

Since both the functional reading and the pair-list are multiple-individual readings, the question to next consider is whether both are available for modified concealed questions. Based on data like that in (54), it seems that the multiple individual reading for MCQs is ambiguous between the pair-list and functional reading. Since modified concealed questions do not come in question-answer pairs per se, I instead test the felicity of a dialogue that consists of a statement with a MCQ and a given response. MCQs elicit three types of available responses: a 'single individual' response, a 'functional' response, and a 'pair-list' response.

(54) I am curious as to the woman that every man loves.

a. Every man loves Marilyn Monroe	Single Individual
b. Every man loves his mother	Functional
c. John loves Mary, Bill loves Sue, and Dave loves Kate	Pair-List

This suggests a parallel between modified concealed questions and genuine questions. Most analyses of pair-list readings rely on *wh*-movement or a *wh*-operator (c.f. Groenendijk & Stokhof 1984; Chierchia 1993, Dayal 1996, Boškovic 2001, Krifka 2001). If it can be shown that concealed questions give rise to pair-list readings in the same way that questions do, it would be a strong argument in favor of analyzing modified concealed questions with some sort of internal question semantics. However, before pursing this line of argumentation, it first needs to be shown (a) that these list-style answers are indicators of genuine pair-list readings, and if so, (b) that these answers cannot easily be attributed to a different source.

1.2 Is it a Genuine Pair-List Reading?

Although basic relative clauses like the one in (51) cannot give rise to any sort of multiple-individual reading, it has been observed (von Stechow 1990, Jacobson 1994, Sharvit 1999) that certain relative clauses give rise to a functional reading that can look very much like a multiple individual reading. This ambiguity is reflected in the possible completions of a specificational sentence whose subject hosts a relative clause containing a quantifier (often called a functional relative clause), as in (55).

(55) The woman that every man loves is…

a. Marilyn Monroe	Single Individual
b. His mother	Functional
c. *John, Mary; Bill, Sue; Dave, Kate[19]	*Pair-List

Given that modified concealed questions have a close functional counterpart (functional concealed questions), it is possible that MCQs have function-like properties which make them behave like these functional relative clauses. Although on-face, functional relative clauses do not give rise to a pair-list reading, while MCQs do, it is possible

[19] Given that this is a single definite DP as the subject in a specificational sentence, the correct paraphrase of (c) might be something closer to (c)' or something similar. Note, however, that this version is just as unacceptable as the full pair-list version.

(c)′ *The woman that every man loves is/are Mary, Sue, and Kate.

(c)" #The women that every man loves are Mary, Sue, and Kate.

that the environment of a MCQ gives rise to a disingenuous pair-list reading that is just an artifact of a distinct functional reading. The next question to ask then is: is the MCQs "list-style" answer a genuine pair-list reading?

Sharvit (1999) lays out a series of diagnostics to distinguish functional readings from pair-list readings, observing that functional and pair-list readings carry different presuppositions, and that in certain constructions, only a functional interpretation is supported. When applied to modified concealed questions, these diagnostics suggest that MCQs give rise to genuine pair-list readings: MCQs display the same presuppositional properties as embedded questions, and, in the right contexts, the ambiguity in possible answers disappears, leaving only the functional answer. This strongly indicates that the list-style answer is a genuine pair-list reading.

The first of these diagnostics, following Groenendijk and Stokhof (1984), looks at the uniqueness requirements of the answer. Functional readings do not require uniqueness of the denotation of the head DP, despite the presupposition-carrying determiner *which* (Jacobson 1994). The pair-list reading, however, generally requires that for each pair, the answer given is the unique answer.

(56) I am curious as to which woman every man hugged.

a. Every man hugged his mother	(and Bill also hugged Kate)	Functional
b. John hugged Mary, and Bill hugged Sue.	(*and Bill also hugged Kate)	Pair-List

(56)a is a fine answer to (56), even if some of the men also hugged their girlfriends. However, (56)b is a felicitous answer only when John hugged nobody but Mary and Bill hugged nobody but Sue[20].

Modified concealed questions appear identical to (embedded) questions in this regard, (57): although the head DP *the woman* should have a presupposition of uniqueness, the functional answer allows for other women to be hugged. However, as with *which*, the pair-list reading requires uniqueness of the answers. This suggests the list-answer reading of MCQs has the same properties that a genuine-pair list reading does.

(57) I'm curious as to the woman that every man hugged.

a. Every man hugged his mother, and Bill also hugged Kate	Functional
b. *John hugged Mary, and Bill hugged Sue and Kate	*List-Answer

The second diagnostic to distinguish functional from pair-list readings is across the board extraction. Sharvit (1999) observes that across the board extraction allows functional readings, but blocks pair-list readings in questions, (58).

(58) I'm curious as to which book every boy hates and every man loves.

a. Every boy hates and every man loves his first picture book.	Functional
b. *John, The Hobbit; Bill, Great Expectations; Fred, Pride and Prejudice…	*List-Answer

This test, when applied to a modified concealed question, yields only the functional answer, indicating the list-style answer is a genuine pair-list reading, not a functional one, (59).

(59) I'm curious as to the book that every boy hates and every man loves.

c. Every boy hates and every man loves his first picture book.	Functional
d. *John, The Hobbit; Bill, Great Expectations; Fred, Pride and Prejudice…	*List-Answer

[20] Sharvit argues that this is because the presupposition carried by the definite determiner applies to two different things: in (56)a, the uniqueness presupposition applies to a function from men to women, requiring that there be a unique function from men to women (which would allow separate man/women pairings), while (56)b requires a unique woman for each man.

The fact that the list-answer reading of MCQs patterns with genuine pair-list readings and not functional readings again suggests that the list-answer reading is in fact a pair-list reading.

Finally, embedding quantifiers inside the question or relative clause can distinguish between functional and pair-list answers. Specifically, changing the quantificational force of the embedded subject changes the available answers – in a matrix question, nearly any quantifier will allow a functional reading, but only *every* and *each* allow a pair-list reading.

(60) Which woman did every man hug?
  a. Every man hugged his wife. Functional
  b. John hugged Mary, Bill hugged Sue… Pair-List

(61) Which woman did most of the men hug?
  a. Most of the men hugged their wife. Functional
  b. *John hugged Mary, Bill hugged Sue… *Pair-List

Interestingly, the same generalization does not hold for embedded questions. Groenendijk and Stokhof (1984) and Szabolcsi (1996), draw a distinction between the *wonder*-class and the *know*-class of embedding verbs, pointing out that they have different properties with regard to the quantifier they allow inside the questions[21]. Specifically, in the *wonder*-class of embedded questions, like in matrix questions, only *every* and *each* can give rise to a pair-list reading, (62), (63).

(62) I wonder which woman every man hugged.
  a. Every man hugged his wife. Functional
  b. John hugged Mary, Bill hugged Sue… Pair-List

(63) I wonder which woman most of the men hugged.
  a. Most of the men hugged their wife. Functional
  b. *John hugged Mary, Bill hugged Sue… *Pair-List

However, the questions embedded under the *know*-class[22] allow pair-list readings with a much wider range of embedded quantifiers.[23] Specifically, they allow pair-list readings with *every,* (64), and *most* (as well as other proportional quantifiers and modified numeral quantifiers), (65) but not with *no/none of the,* (66):

[21] It is worth briefly considering what exactly the *wonder*- and *know*-classes are. Groenendijk and Stokhof (1984) describe them as *intensional* (*wonder*) and *extensional* (*know*), arguing that the intensional class embeds questions, while the extensional class embeds answers. Under this analysis, it is not surprising that embedded questions under *wonder* behave exactly like questions, while embedded questions under *know* do not seem to have quite the same distribution (being answers, rather than questions).

An important observation to note, which I will return to later, is the fact the 'extensional' verbs, which allow for a wider range of quantification, seem to be exactly the verbs that embed concealed questions. Moreover, these seem to be the same class of verbs that show quantificational variability effects (Lahiri, 2000).

[22] Since statements with *know* in them don't really justify a conversational response in the same way that those with *curious as to* or *wonder* do, I test the availability of each reading by testing the felicity of the same speaker giving either a functional follow up or a pair-list style follow up to the original statement:

(i) I know the book that every boy read - every boy read his favorite novel.

(ii) I know the book that every boy read - John read AG, Bill read TH, and Dave read EG.

(64) I know which woman every man hugged
  a. Every man hugged his wife. Functional
  b. John hugged Mary, Bill hugged Sue… Pair-List

(65) I know which woman most of the men hugged.
  a. Most of the men hugged their wife. Functional
  b. John hugged Mary, Bill hugged Sue… Pair-List

(66) I know which woman none of the men hugged.
  a. None of the men hugged their wife. Functional
  b. *John (didn't hug) Mary, Bill (didn't hug) Sue… *Pair-List

Modified concealed questions show the exact same distribution as the embedded questions under *know* – they allow the pair-list reading with nearly all quantifiers except *no/none of the*:

(67) I know the woman most of the men hugged
  a. Most of the men hugged their wife. Functional
  b. John hugged Mary, Bill hugged Sue… Pair-List

(68) I know the woman none of the men hugged.
  a. None of the men hugged their wife. Functional
  b. *John (didn't hug) Mary, Bill (didn't hug) Sue… *Pair-List

Similarly, when the head quantifier *every* is modified by *almost,* neither *know*-embedded questions, (69), nor MCQs, (70), give rise to a pair-list reading.

(69) I know which woman almost every man hugged.
  a. The one he likes Functional
  b. *Bill hugged Mary; Joe hugged Sue… *Pair-List

(70) I know the woman almost every man hugged.
  a. The one he likes Functional
  b. *Bill hugged Mary; Joe hugged Sue… *Pair-List

Although the reasons for the difference in distribution between matrix questions/*wonder*-embedded questions and *know*-embedded questions is not entirely clear (c.f. Szabolcsi 1997 for an analysis), it is clear that modified concealed questions seem to pattern identically to *know*-embedded questions with regard to the list-style answers, strongly supporting the observation that MCQs do give rise to genuine pair-list readings.

1.3 The Source of the Pair-List Reading

The data from the last section strongly points to MCQs giving rise a genuine pair-list reading. Though this invites an immediate comparison between *wh*-questions and modified concealed questions, there are other constructions

[23] Although *curious as to* seems to embed concealed questions and allows pair-list readings with non-universal quantifiers, it is not immediately clear that it is extensional in the way that G&S discuss. Therefore, for this test, I will use the more clearly "extensional" verb *know*.

that seem to give rise to a pair-list reading, specifically certain functional relative clauses that contain an anaphor in the RC head (aRCs):[24]

(71) The picture of himself that every student hated was in the yearbook
  a. Specifically, his senior photo
  b. Specifically, for John, the picture from the beach, for Bill, the picture from prom,…

Note that these functional relative clauses without the anaphor do not give rise to any sort of pair-list reading (even if they include a pronoun), as in (72).

(72) The picture (of her) that every boy hated was in the yearbook
  a. Specifically, Mary's senior picture
  b. *Specifically, for Mary, the picture from the beach, for Sue, the picture from prom…

Before concluding that MCQs behave like questions, it needs to be shown that the (non-question) environment that gives rise to the pair-list readings in (71) cannot explain the pair-list readings found in MCQs. I show that pair-list readings in anaphor relative clauses have a very different distribution than either those in questions or in MCQs.

There are a number of noteworthy differences between anaphor relative clauses and MCQs. First is the obvious fact that the aRC requires a pronoun in the head, while modified concealed questions do not. It is not obvious how one could give a unified account of the concealed question environment (question-taking verbs) and the anaphor relative clause environment. However, even if a unified account cannot be offered, there is still the worry that environments besides question environments can give rise to genuine pair-list readings. However, it seems that the pair-list readings generated by aRCs and those generated by MCQs are actually quite different.

First, observe that questions and modified concealed questions show a subject/object asymmetry, such that the pair-list reading is only available for object questions and MCQs with object relativization:

(73) Which woman hugged every man?

a. Mary (hugged every man)	Single Individual
b. *His mother (hugged every man)	*Functional
c. *Mary hugged John, Sue hugged Bill…	*Pair-List

(74) I'm curious as to the women who hugged every man

a. Mary (hugged every man)	Single Individual
b. *His mother (hugged every man)	*Functional
c. *Mary hugged John, Sue hugged Bill…	*Pair-List

Interestingly, the anaphor RCs show no subject/object asymmetry, still giving rise to a pair-list reading, even when subject-relativized:[25]

[24] Since full sentences of this sort don't ellicit a response or clarification in the way that questions and concealed questions do, I use "specifically" to make the continuations of the main sentence more natural (assuming they are coming from the original speaker).

[25] Note that the lack of subject/object asymmetry in (75) isn't due to any special properties of verbs like *annoy* – the concealed question counterpart of (75) does not have any multiple individual reading when subject-relativized:

(i) I'm curious as to the picture that annoyed every student
  a. *His self portrait
  b. *for John, the picture from the beach, for Bill, the picture from prom…

(75) The picture of himself that annoyed every student was in the yearbook.
   a. Specifically, It was his self-portrait
   b. Specifically, for John, the picture from the beach, for Bill, the picture from prom…

This immediately suggests that the way that multiple individual readings for aRCs arise is very different from the way that the multiple individual readings for MCQs arise.

Second, it is arguable that the pair-list reading in (71) is not actually a genuine pair-list reading in the way that question and MCQ pair-list readings are.[26] The diagnostics from above suggest that the pair-list interpretation of aRCs is not the same as the pair-list reading of MCQs and questions.

Specifically, the pair-list reading of aRCs, unlike those of MCQs, do not show any effects of a uniqueness presupposition from the determiner – both the functional reading and the pair-list reading do not require that the object in question is the unique object, (76).

(76) The picture of himself that every student hated was in the yearbook
   a. Specifically, for every student it was his senior photo, although for Bill also his basketball photo.
   b. Specifically, for John, the picture from the beach, for Bill, his prom picture, and his basketball picture.

Similarly, when put into an ATB structure, the aRCs continue to give rise to both a functional and a pair-list reading.

(77) The picture of himself every student hated and every professor loved was in the yearbook
   a. Specifically, his posed head-shot
   b. Specifically, for John, his debate photo, for Bill, his head shot, for Prof Smith, his action photo…

Interestingly, when aRCs have an embedded quantifier other than *every*, both multiple individual readings seem to disappear[27]:

(78) The picture of himself which most students hated was in the yearbook.
   a. ??Specifically his/their senior photo(s)
   b. *For John, his senior photo, for Bill, his basketball photo….

These data oppose any sort of analysis that argues that the environment of modified concealed questions somehow gives rise to the same available readings as the environment of aRCs.

The last set of data strongly suggest that the pair-list reading of anaphor relative clauses is quite different than the pair-list reading from modified concealed questions. Furthermore, it is clear both that the environments that give rise to these readings are very different, and, from the data above, that the two different environments do not give rise to the same type of reading. While the characteristic and distribution of modified concealed questions and

[26] It is possible that the tests I use aren't tests for "genuine" pair-list reading, but rather tests for *wh*-pair-list readings. This would not affect the main point: modified concealed questions give rise to a completely different type of reading than anaphor relative clauses.

[27] Note that giving the anaphor in the relative clause head plural marking seems to allow the functional reading, but still not the pair-list reading. Either way, aRCs show a different distribution than MCQs.

(i) The picture(s) of themselves which most students hated was in the yearbook.
   a. Specifically their senior photos Functional
   b .*For John, his senior photo, for Bill, his basketball photo…. *Pair-List

embedded questions looks identical, modified concealed questions and anaphor relative clauses seem to share no properties other than having a list-style reading to begin with.

Thus it seems (a) that modified concealed questions give rise to genuine pair-list readings and (b) that these pair-list readings look identical to the pair-list readings generated by embedded questions. This offers a strong argument in favor of analyzing modified concealed questions as having some sort of internal question semantics.

1.4 Double MCQs

However, the pair-list readings that concealed questions give rise to differ noticeably from those of embedded question in an important way: CQs do not allow embedded *wh*-phrases (a fact that, as far as I know, has been up to now, unobserved).

Embedded questions (as well as matrix questions) can give rise to pair-list readings both with a *wh*-phrase and a quantifier, as described above, and with two *wh*-phrases, as in (79).

(79) a. Mary knows which book every student read.
b. Mary knows which student read which book[28].

However, concealed questions do not tolerate any embedded wh-phrases, either in subject position, (80)a, or object position, (80)b.

(80) a. *Mary knows the book which student read.
b. *Mary knows the student who read which book.

This suggests that, although the pair-list readings available for MCQs are genuine, they cannot be generated by a mechanism that would also license an embedded *wh*-phrase. Similarly, MCQs do not tolerate a second 'concealed question' DP inside of the modifier, where a lower definite DP acts like a *wh*-phrase, rather than a definite description.

(81) [[I know the book that the boy read this summer]] ≠ [[I know which book which boy read this summer]]

This suggests that the operator that licenses the pair-list reading generated by the head DP and the in-situ quantifier is not an operator that can also license *wh*-like arguments inside the restrictor.

1.5 Nathan 2005 and Pair-List Reading

The existence of a question-like pair-list reading in modified concealed questions seems problematic for Nathan's account of MCQs, which does not include any sort of question-like operator.

1.5.1 A QR Solution to the Pair-List Reading

Without a Q-operator, the obvious way to attempt to account for these readings is to assume that the quantifier inside the relative clause (e.g. *every boy*) raises out to take scope over the CQ head. There are two obvious landing sites for this, one immediately under the VP, (83), and one above (84), which give rises to the paraphrase in (a) and the LF in (b).

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[28] Due to superiority effects, the underlying higher *wh*-phrase moves to CP while the lower remains in situ. However, with two *which*-NP phrases, the object can be fronted:

(i) I know which book which student read

(82) Mary knows the book that every boy read

(83) a. Mary knows of every boy_i the book that he_i read
b. Mary knows [every boy_i [the book that t_i read]]

(84) a. Every boy_i is such that Mary knows the book that he_i read
b. Every boy_i [Mary knows [the book that t_i read]]

Although for both of these options, it seems possible to derive the semantics such that they give the right truth conditions of (82), a solution of this sort gives rise to a number of problems.

First, the types of the QRed quantifiers need to be somewhat unusual. Specifically, rather than being a function from two sets of individuals to truth values, these raised quantifiers need to be a function from a set of individuals to a function that maps individuals to propositions, and returns propositions. Though this can easily be defined, it is not clear that this is simply a categorial variation of the basic quantifier *every*.

Second, relative clauses are generally taken to be islands for both overt movement, (85), and covert movement, (86). In (85) the *wh*-phrase cannot move out of the relative clause to the matrix spec-CP, and in (86), the quantifier cannot raise out of the relative clause to take scope over the indefinite *a*.

(85) Mary read the book that John gave to Sue
a. Mary read the book that John gave to who?
b. *Who did Mary read the book that John gave to?

(86) Mary read a book that every boy likes
a. Mary read a book that was liked by all of the boys
b. *For each boy, Mary read a book that he likes

However, Hulsey and Sauerland (2006) argue that not all relative clauses are strong islands for movement. Based on sentences like (87), they argue that raising relative clauses can allow movement outside of the RC.

(87) The picture of himself that everybody sent in annoyed the teacher. (Hulsey and Sauerland 2006: 14)

Specifically, they argue that without assuming movement, the only available reading for *the picture of himself* should be a single picture of everybody. The fact that there is a salient reading of a different picture for every person indicates that the subject *everybody* can QR out of the RC.[29]

They point out that QRing out of a matching relative clause does not seem to be as viable a solution, as the movement should incur a weak crossover violation. If this is so, and the quantifier raising story for the pair-list reading is correct, we have an argument for analyzing modified concealed questions as raising rather than matching. This raises an immediate problem for Nathan: in order to QR out of a relative clause, the RC should be raising, yet his solution requires that a concealed question be a matching relative clause (see section 2 of this chapter for more arguments about raising and matching diagnostics for concealed questions).

[29] It seems that these relative clauses are very close to Sharvit's functional relative clauses discussed earlier (as acknowledged and discussed by Hulsey and Sauerland). If it turns out that the inverse scope reading of these relative clauses is in fact a functional reading, then the original argument that all relative clauses are islands remains problematic for any solution that requires QRing out of a modified concealed question.

Additionally, it is not clear that this analysis is actually correct for modified concealed questions. Hulsey and Sauerland specifically limit their argument to distributive universal quantifiers. This limitation seems to be justified, given the data in (88) and (89), which do not seem to support the inverse scope reading:

(88) ??The picture of himself that most people sent in annoyed the teacher.
(89) ??The picture of himself that at least three people sent in annoyed the teacher.

Modified concealed questions, on the other hand, do give rise to a pair-list reading when the internal DP is a proportional, (90), or modified numeral quantifier, (91).

(90) John knows the book that most of the students read.
  a. John knows the one book that was read by most of the students. Single Individual
  b. John knows, for most of the students, the book that they read. Pair-List

(91) John knows the book that at least three of the students read.
  a. John knows the one book that was read by at least three of the students. Single Individual
  b. John knows for at least three of the students, the book that they read. Pair-List

This suggests that a quantifier-raising analysis for the pair-list reading in MCQs, as Nathan would need to employ, is not empirically adequate.

1.5.2 Doubly Quantified Concealed Questions

An additional complication of accounting for the pair-list reading via QR arises when considering modified concealed questions with a quantificational head, as in (92).

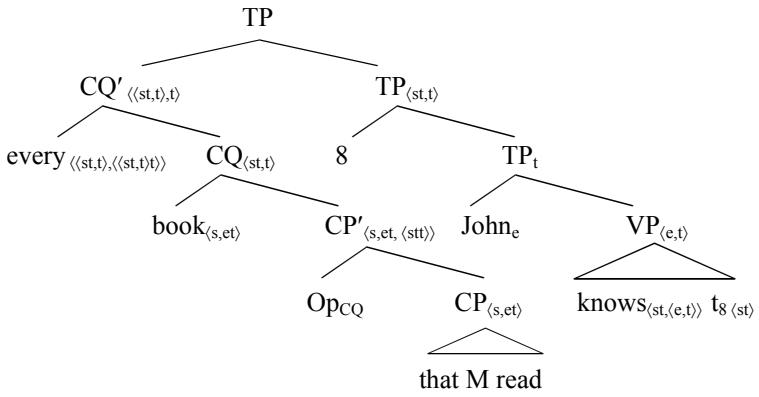
(92) John knows every book that Mary read.

Nathan accounts for quantified concealed questions by treating the quantifier as something that quantifies over sets of propositions, in parallel to his treatment of the definite determiner the_{prop}. These quantifiers relate two sets of positions (type ⟨stt, ⟨stt, t⟩⟩), which Nathan points out is just a crosscategorial variant of standard quantifiers relating two sets of individuals (of type ⟨et, ⟨et, t⟩⟩). The quantifier combines with the bare concealed question (*book that Mary read*), creating the standard problem of a quantifier in object position – *every book that Mary read* is of type ⟨stt, t⟩, rather than of type ⟨s,t⟩. Nathan argues that the quantified CQ undergoes QR, raising to the top of the matrix clause and leaving behind a trace of type ⟨s,t⟩. Thus (92) can be paraphrased as *for every (true) proposition that expresses x is a book that Mary read this summer, John knows that the proposition is true,* with the following LF:

(93) $\forall p_{\langle st \rangle}$. [[$\exists$x. p = λw. x is a book that Mary read in w] → [$\forall$w [$Dox_{john}(w)(w_0)$ → p(w) = 1]]]

The associated syntactic structure would need to look something like (94):

(94)



It is unclear, however, that these are actually the correct truth conditions. At the moment there is no constraint on the book variable x as to what sort of entity it is. This would suggest that the full set of propositions in {p: ∃x. p = λw. x is a book that Mary read in w} would include both of the following propositions:

(95) a. 'The Hobbit' is a book that Mary read
b. The book that J.R.R. Tolkien wrote for his sons is a book that Mary read

In w_0, these two propositions are truth conditionally equivalent. This predicts that for John to know all of the propositions that are in the above set (assuming Mary really did read *The Hobbit*), he must know both (95)a and (95)b. Seeing as most entities can be picked out by a large number of definite descriptions (e.g. *the book that introduced Bilbo Baggins*, *the book Tolkien published in 1973*, …), these truth conditions are clearly not correct – they predict that John has to know all of the definite descriptions of all the books that Mary read.

A similar problem arises with proportional quantifiers. For *John knows more than half of the book Mary read,* Nathan would predict that John knows more than half of the propositions of the correct form. However, given that many of these could be truth conditionally equivalent, it would be possible for John to know more than half of the propositions without actually knowing more than half of the book (extensions) that Mary read (if for example, he knew an extraordinary amount about one of the books in particular).

Although it would be possible to build in constraints (e.g. x has to be a name, not a definite description), it is not clear how to do that without over-limiting: using definite descriptions as an "answer" to a statement containing a MCQ is perfectly acceptable, as in (96), indicating that a possible denotation of a MCQ is indeed a definite description, not a name:

(96) I know the book that Mary read yesterday. It was the one that John wrote.

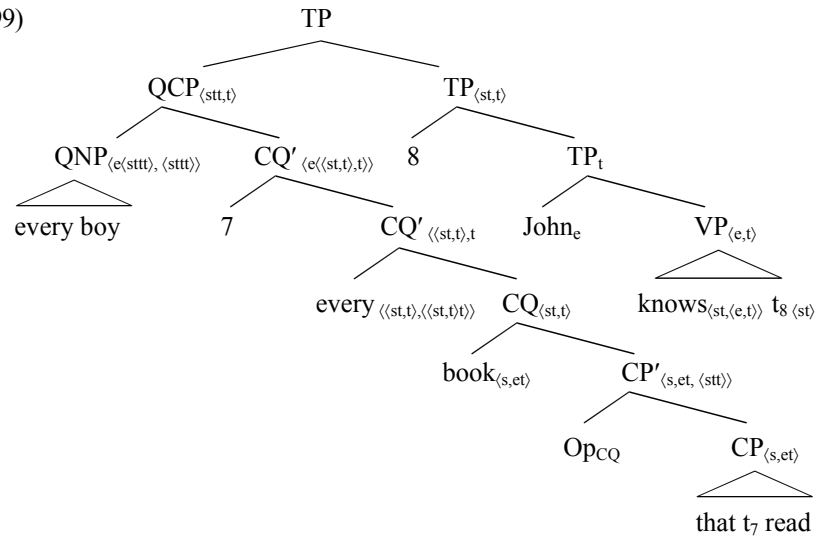
Nathan's solution of quantifying over propositions gives rise to a second problem, specifically when considering MCQs with both quantificational heads and embedded quantifiers. Like definitely headed MCQs, these give rise to a pair-list reading, (97):

(97) Mary knows every book that every boy read
a. Mary knows every book that was read by all of the boys — Single Individual
b. Mary knows, for every boy, all of the books that he read — Pair-List

How to account for the pair-list reading in these structures using QR is not immediately apparent. If the embedded QNP moves just to the top of the CQ, which then moves as a whole to the top of the matrix, it makes very odd predictions for the meaning and structure of the moved CQ, (98), (99).

(98) $\forall p_{\langle st\rangle}$. [[$\exists$x. p = λw. x is a book that y read in w] → [$\forall$w [$Dox_{john}(w)(w_0)$ → p(w) = 1]]]

(99)



Note specifically that this structure requires a tailor-made definition for *every*, which needs to be of type ⟨et⟨e⟨sttt⟩,⟨sttt⟩⟩⟩. The structure in (99) looks something like an inverse linking structure, where the internal quantifier (*every book*) needs to be modified by something in the nuclear scope of the higher quantifier *every boy*. Though not necessarily impossible, to get the semantics right requires a number of non-straightforward assumptions.

On the other hand, having the embedded QNP raise all the way to the top of the matrix seems to predict the right truth conditions:

(100) $\forall$y.[y is a boy] → [$\forall p_{\langle st\rangle}$. [[$\exists$x. p = λw. x is a book that y read in w] → [$\forall$w [$Dox_{john}(w)(w_0)$ → p(w) = 1]]]

> For every individual y, if y is a boy, then for all propositions of the form *that x is a book that y read*, John knows the proposition is true.

However, achieving this LF is structurally problematic. If the embedded QNP moves out after the CQ raises, it is a case of left branch extraction, which is argued to be an ungrammatical movement. If the embedded QNP moves before the CQ raises, then the trace it leaves behind will become unbound as soon as the CQ moves to the top of the matrix (and thus past the moved QNP).

An additional problem comes when considering the contrast between the available readings for (101)a and (101)b, where one has an embedded universal quantifier, and one has a modified numeral:

(101) a. Mary knows most of the books that every boy read.
b. Mary knows most of the books that at least five boys read.

Both give rise to a non-pair list reading, (101), in which, of the set of books that were read by the boys in question, Mary knows what a good portion of them are.

(102) a. Mary knows most of the books that were read by every boy.
b. Mary knows most of the books that were read by at least five boys.

Additionally, both give rise to a basic-pair list reading, in which, for the boys in question, Mary knows most of the books that each of them read.

(103) a. Mary knows, for every boy, most of the books that each read.
b. Mary knows, for at least 5 boys, most of the books that each read.

However, (101)a gives rise to a third reading which seems to be unavailable for (101)b. Consider a scenario in which five boys read five different books, and Mary knows what four of the five boys read. This can be correctly described by (101)a but not by (101)b:

(104) a. Mary knows mostly, for every boy, the book that each read
b. *Mary mostly knows, for at least 5 boys, the book that each read

Thus, to summarize, there is a difference in possible readings for quantified concealed questions that embed universal quantifiers, (105) and those that embedded non-universal quantifiers, (106).[30]

(105) Mary knows most of the books that every boy read
a. Mary knows most of the books that were read by every boy
b. Mary knows, for every boy, most of the books that each read.
c. Mary knows mostly, for every boy, the book that each read

(106) Mary knows most of the books that at least five boys read
a. Mary knows most of the books that were read by at least 5 boys
b. Mary knows, for at least 5 boys, most of the books that each read.
c. *Mary mostly knows, for at least 5 boys, the book that each read

Using quantifier raising to generate the pair-list readings available for modified concealed questions has a particularly hard time explaining the contrast between (105)c and (106)c, as it would require special movement constraints for non-universal quantifiers (or special allowances for universal quantifiers).

Additionally, it seems that to characterize the third reading in terms of scope, the concealed question head *most* needs to scope over the matrix verb *know*, while the embedded subject *every boy* needs to remain in the scope of *know*. It is not straight-forward to define *most of the* (the quantifier over propositions) such that it can take scope over *know* while leaving the relative clause portion of the modified concealed question within the scope of *know*, as *most* does the semantic work in making the concealed question interpretable to the question-embedding verb to begin with[31].

(107) $^{??}$ [$\text{Most}_{8\langle stt,\langle stt\rangle t\rangle}$ [John_e [$\text{knows}_{\langle st,\langle e,t\rangle\rangle}$ t_8 [book Op_{CQ} that every boy read]$_{\langle st,t\rangle}$]]]

Thus, though it is not necessarily impossible to give a QR-account of the pair-list readings in modified concealed questions, it is not at all clear that it can be done without making highly non-standard assumptions about the syntax and semantics of these structures. This suggests that Nathan's analysis of modified concealed questions cannot easily account for the pair-list readings they generate.

[30] Note that Lahiri (2002) observes a very similar fact about the quantificational variability in embedded questions. I discuss this more in Chapter 4.

[31] There is possible insight in that (other than *every*) only the partitive seems to license quantified concealed questions, suggesting perhaps that a decompositional analysis of *most of the* in which *the* acts as a maximality operator from sets of propositions to the concealed question proposition, while *most* can separately scope over the matrix verb know, giving rise to the quantificational variability effects seen above.

(i) John knows most/few of the books that Bill read.
(ii) $^{??}$John knows most/few books that Bill read.

2. Raising and Matching Relative Clauses

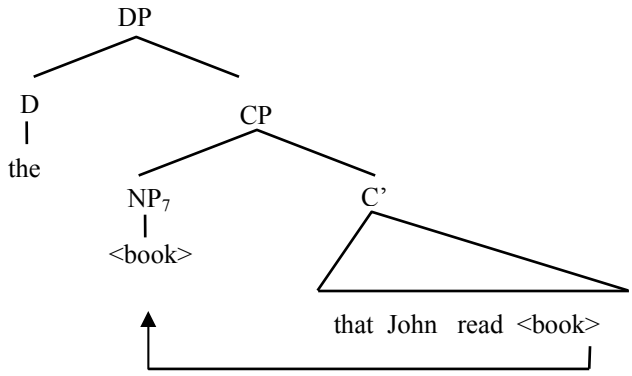
In this section, I will examine the external structure of modified concealed questions. It is widely assumed that restrictive relative clauses can have two potential structures; a raising structure, in which the NP of the DP hosting the relative clause originates inside the relative clause, and a matching structure, in which a second external copy of the NP is based-generated outside of the relative clause. Following, among others, Safir (1999) and Sauerland (2002), I assume that both forms of relative clause have a complex internal-head, rather than a phonetically null operator which binds the trace position. Many arguments have been laid out to support this analysis, including reconstruction effects, Double Headed ACD, pronoun and variable binding, and weak-crossover violations (Sauerland 2002).

The standard assumption that this complex internal-head takes the form of a NP (Kayne 1994, Sauerland 2002), giving rise to a raising structure (108), and a matching structure (109).[32]

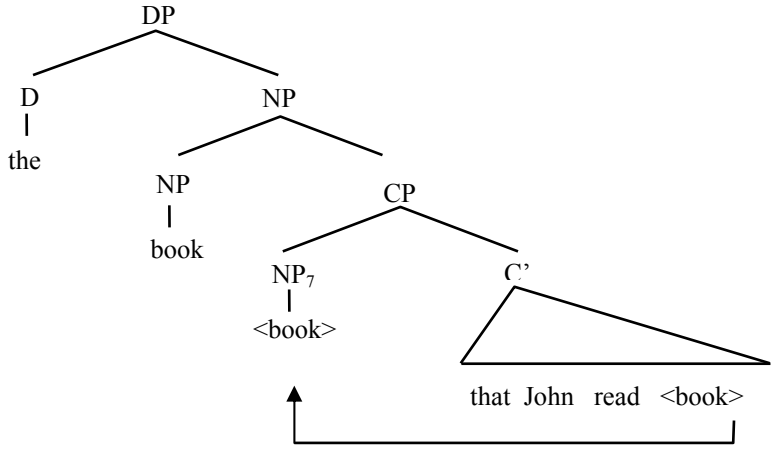
(108) Raising: …[$_{DP}$ the [$_{CP}$ book$_1$ that John read <book>$_1$]].

(109) Matching: …[$_{DP}$ the [$_{NP}$ book [$_{CP}$ ~~book$_1$~~ that John read <book>$_1$]]].

(108)′



(109)′



[32] Throughout, I use <xxx> to indicate the bottom copy of a movement chain, and ~~xxx~~ to indicate phonetic deletion

In this section, following in part Hulsey and Sauerland (2006), I apply to MCQs a series of tests that distinguish internally headed (raising) relative clauses from externally headed (matching) relative clauses. The distinguishing property most relevant for these diagnostics is whether there is a copy of the head-NP outside the relative clause. From this, I conclude that concealed questions[33], (111)a, are necessarily internally headed, in contrast with the minimally differing restrictive relative clauses, (110)a, which seem to optionally allow an external head. Instead, concealed questions pattern with embedded questions, which as expected from their standardly assumed structure, do not tolerate a second copy of the *wh*-phrase. I also apply the tests free relatives to provide a more complete picture of the paradigm.[34]

(110) a. Mary sold the book that John is reading RR
b. Mary sold what John is reading FR

(111) a. Mary is curious as to the book that John is reading CQ
b. Mary is curious as to what book John is reading EQ

Together, the diagnostics presented below indicate that:

a. restrictive relative clauses come in both varieties[35]
b. concealed questions, like embedded questions, do not tolerate external heads

The data on free relatives, however, are inconclusive. This could be because the "modified" free relatives I used to test are either not genuine free relatives or are not particularly grammatical in and of themselves. Most important for the purpose of this paper, the concealed question data suggests that Nathan's analysis of modified concealed questions, which necessitates an externally headed structure, is not empirically adequate.[36]

2.1 Idioms

Hulsey and Sauerland (2006) argue (following Brame 1968, Schachter 1973, Marantz 1984, and Chomsky 1993) that if an idiomatic interpretation of the host DP is available, the relative clause must have a raising structure, as the entire head needs to be able to reconstruct into the idiom constituent, (112). Thus the availability of idiomatic readings can be used to test for a raising structure in various relative clause constructions: if an idiomatic reading of the host DP is not available, it is evidence that the relative clause does not have a raising structure.

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[33] For this section, I use the CQ embedding predicate *be curious as to,* because it does not allow for the ambiguities that *know* and similar verbs give rise to, which can make distinguishing a concealed question reading from a familiar reading very difficult in some of the environments.

[34] Since most of the follow tests require testing for an external copy of the NP, I give free relatives in the form of *whatever NP that.* It is not immediately clear to me if this is a completely valid way to test free relatives, as this construction differs from standard free relatives both in having a complex head and allowing for a complementizer.

[35] Because restrictive relative clauses are ambiguous between a matching structure and a raising structure, they do no give rise to ungrammaticality in any of the test environments. However, the validity of the tests can be seen by stacking incompatible constraints: when an environment that requires a raising structure (e.g. idioms) is combined with an environment that requires a matching structure (e.g. extraposition), the resulting relative clause is ungrammatical:

(i) *Mary noticed the headway yesterday that John made.

[36] See Harris 2007 for implications of a raising verse matching for concealed questions, especially with regard to Heim's Paradox.

(112) The headway that John made

a. Raising: $[_{DP}$ the $[_{CP}$ headway$_1$ [that John made <headway>$_1$]]

b. *Matching: * $[_{DP}$ the $[_{NP}$ headway $[_{CP}$ ~~headway~~$_1$[that John made <headway>$_1$]]

Applying this test to the paradigm, it seems that none of the four constructions require an external copy of the NP:

(113) a. Mary noticed the headway that John made — RR: No External NP
b. Mary noticed whatever headway that Bill made — FR: No External NP

(114) a. Mary is curious as to the headway that John made — CQ: No External NP
b. Mary is curious as to what headway John made — EQ: No External NP

2.2 Condition A Violations

Condition A of Binding Theory states that an anaphor must be locally bound by its antecedent. In a raising structure, the highest copy of the anaphor is embedded inside the relative clause, violating the strict locality constrains of Condition A. However, in a matching structure, the high copy of the anaphor will share a clause with its binder, and no Condition A violation will occur. Thus a Condition A violation in a relative clause suggests a raising structure, (115).

(115) John likes the picture of himself that Sue has in her office

a. *Raising:
John likes $[_{DP}$ the $[_{CP}$ picture of himself$_{i1}$ [that Sue has <picture of himself$_i$>$_1$ …]]

b. Matching:
John likes $[_{DP}$ the $[_{NP}$ picture of himself$_{i1}$ $[_{CP}$ ~~picture of himself~~$_i]_1$ [that Sue has <picture of himself$_i$>$_1$ …]]

The data in (116)-(119) shows that restrictive relative clauses can have an external copy of the NP, as can free relatives (in so far as speakers are willing to accept that form of a free relative). However, concealed questions and embedded questions both incur Condition A violations for reflexive and reciprocal anaphors, indicating that they have no external copy of the NP.

(116) a. Every boy likes the picture of himself$_i$ that Mary has in her office — RR: External NP
b. Every boy likes whichever picture of himself$_i$ that Mary has in her office — FR: External NP

(117) a. John and Mary$_i$ like the pictures of each other$_i$ Sue has in her office — RR: External NP
b. John and Mary$_i$ like the pictures of each other$_i$ Sue has in her office — FR: External NP

(118) a. *Every boy is curious as to the picture of himself$_i$ Mary has in her office — CQ: No External NP
b. *Every boy is curious as to which picture of himself$_i$ Mary has in her office — EQ: No External NP

(119) a. *John and Mary$_i$ are curious as to the pictures of each other$_i$ Sue has in her office — CQ: No External NP
b.* John and Mary$_i$ are curious as to which pictures of each other$_i$ Sue has in her office — EQ: No External NP

2.3 Variable Binding

Hulsey and Sauerland (2006) argue that if a pronoun in the host DP can be bound by an operator inside the relative clause, the relative clause must have a raising analysis, as operators can only bind pronouns whose chains they c-command. In a matching structure, the higher copy of the pronoun will never be within in the domain of the

embedded operator, (120). Thus if a pronoun in the host DP is bound by an element inside the relative clause, a raising structure must be assumed.

(120) The picture of his$_i$ father that every boy$_i$ saw…

a. Raising

[$_{DP}$ the [$_{CP}$ picture of his$_i$ father$_1$ [that every boy$_i$ saw < picture of his$_i$ father >$_1$]]

b. *Matching

[$_{DP}$ the [$_{NP}$ picture of his$_i$ father [$_{CP}$ ~~picture of his~~$_i$ ~~father~~$_1$ [that every boy$_i$ saw <picture of his$_i$ father>$_1$]]]]

Applying this diagnostic to restrictive relatives, we see that restrictive relatives do not require an external head, that free relatives seem to (though the unacceptability might be from a separate source), and that neither concealed questions nor embedded questions have an external head.

(121) a. Mary bought the picture of his$_i$ father that every boy$_i$ saw — RR: No External NP

b. *Mary bought whatever picture of his$_i$ father that every boy$_1$ saw — FR: ?? External NP

(122) a. Mary is curious as to the picture of his$_1$ father that every boy$_1$ saw — CQ: No External NP

b. Mary is curious as to which picture of his$_1$ father every boy$_1$ saw — EQ: No External NP

2.4 Condition C

Condition C of binding theory states that a referring expression cannot have a c-commanding antecedent. Interestingly, when there is a higher copy of the NP (disallowing reconstruction), the lower copy does not incur any Condition C violations, possibly indicating that phonetic deletion also involves shifting the lower copy into something closer to a pronoun (c.f. Fiengo & May's 1994, Fox 2002), or that the raised internal copy can reconstruct fully below the R-expression (neither of these options would be available for raising RCs as the high NP is required to get the semantics right). Because of this effect, a Condition C violation in relative clauses indicates a raising structure, (123).

(123) Mary likes the picture of John$_1$ that he$_1$ has in his office

a. *Raising:

Mary likes [$_{DP}$ the [$_{CP}$ picture of John$_{i1}$ [that he$_i$ has <picture of John$_i$>$_1$ …]]

b. Matching:

Mary likes [$_{DP}$ the [$_{NP}$ picture of John$_{i1}$ [$_{CP}$ ~~picture of John~~$_i$]$_1$ [that he$_i$ has <picture of him (John)$_i$>$_1$ …]]

This data provides corroborating evidence to the conclusions drawn from the tests above: restrictive relative clauses can have a matching structure with an external copy of the NP, while concealed questions and embedded questions have only a raising structure, without any external copy of the NP.

(124) a. Mary sold the picture of John$_1$ that he$_1$ likes — RR: External NP

b. Mary sells whatever pictures of John$_1$ that he$_1$ likes — FR: External NP

(125) a. *Mary is curious as to the picture of John$_1$ that he$_1$ likes — CQ: No External NP

b. *I am curious as what picture of John$_1$ he$_1$ likes — EQ: No External NP

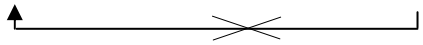
2.5 Extraposition

Extraposition provides a final test to distinguish between raising and matching. Hulsey and Sauerland (2006) argue that only a matching structure is compatible with extraposition of the relative clause. Temporal adjuncts, which

mark the edge of VP, split the relative clause and host DP, indicating late merge of the relative clause. Late merge has been shown to be available only for matching structures, as matching structures allow for two self-contained components – the host DP and the complete relative clause. In a raising structure, however, the relative clause and the host DP form a single chain, which cannot be split up via late merger. Thus if extraposition is allowed in a relative clause, the relative clause is argued to have a matching structure.

(126) Mary read the book yesterday that John read

a. *Raising: … [$_{DP}$ the [$_{CP}$ book$_i$]] yesterday [that John read <book>$_i$].



b. Matching: … [$_{DP}$ the [$_{NP}$ book]] yesterday [$_{CP}$ ~~book$_i$~~ that John read <book>$_i$].

This diagnostic continues to support the ambiguity of restrictive relation clauses. However, the ungrammaticality that results when a VP adjunct is added to a concealed question indicates, in line with the earlier tests, that concealed question and embedded questions cannot have an external head, (128). Embedded questions and free relatives also do not seem have an external head.

(127) a. Mary sold the book yesterday that John likes — RR: External Head
b. *Mary sold whatever yesterday John likes — FR: No External Head

(128) a. *I was curious as to the book yesterday that John read — CQ: No External Head
b. *I was curious as to what book yesterday John read — EQ: No External Head

2.6 Conclusion

The diagnostics presented test whether a CP structure has an external copy of the host NP outside of the CP or if the NP head is part of a chain inside the relative clause. They show conclusively that modified concealed questions seem to be necessarily raising – that is, they do not tolerate an external copy of the NP head. Thus it seems that MCQs pattern, in this regard, much closer to embedded questions, which also do not allow an external copy of the moved wh-*phrase*, than to relative clauses, which seem to optionally allow a second copy of the host head.

Recall that the analysis that Nathan (2005) puts forward for modified concealed questions seems to necessitate a matching structure for the relative clauses that become MCQs – the head NP and the relative clause need to exist as two separate pieces. Because of this, the data presented in this section provide a strong argument against Nathan's analysis of modified concealed questions, pointing instead to an analysis that treats the host NP as part of a chain originating inside the relative clause modifier.

Chapter Four: A Modified Account:

In this chapter, I review the core properties of modified concealed questions as discussed in the previous chapters arguing that together they nicely circumscribe the space of possible analyses of MCQs. I then develop a novel account based on Nathan (2005), which explains the set of properties of MCQs that were problematic for Nathan (2005) while keeping its explanatory power regarding the external distribution of MCQs intact.

1. What Needs to Be Accounted For

Over the last three chapters, I have discussed a number of properties about modified concealed questions. A complete analysis of MCQs should be able to account for, or at least be compatible with, all of these facts. The properties that I have been able to discuss here cover both facts about external properties of MCQs, including what they can combine with and the possible meaning they contribute, as well as internal properties, including structural facts and constraints on the internal composition.

External Distribution:
As Nathan (2005) observed, MCQs can embed only under question-embedding verbs that also embed proposition, such as *know*, and not under pure question-taking verbs, such as *wonder*.

(129) a. I know the book that John read this summer
b. *I wonder the book that John read this summer

This suggests that the basic semantic type of a modified concealed question is not identical to an embedded question, but rather is linked closely to a propositional denotation.

Modification:
As has been long observed, the DP heads of MCQs require a relative clause-like modifier to act as concealed questions when embedded under question-taking verbs.

(130) a. I know the book that John read this summer
b. *I know the book

The necessity of the relative clause-like modifier, as Nathan (2005) argues, indicates that it plays a crucial role in generating the concealed question denotation. Any analysis of modified concealed questions should capture the fact that modified NPs, but not bare NPs, can serve as concealed questions.

Requiring a modificational component is a property that distinguishes modified concealed questions from their more commonly discussed cousins, functional concealed questions, in which the head noun seems to have special properties that allow it to receive a concealed question denotation without any sort of additional modification.

(131) a. I know the price of gas that Chevron set this summer
b. I know the price of gas

I argue that a number of properties distinguish modified concealed questions from functional concealed questions, including their internal binding properties and external distribution. This suggests that modified concealed questions require an independent analysis, and should not be considered a special case of functional concealed questions.

Internal Headedness:

In the last chapter, I show that a stable syntactic property of modified concealed questions is that they cannot tolerate an external copy of the head NP. Though they look on face like DPs modified by a restrictive relative clause, and so should be compatible with either a single internal instance of the head NP which originates inside the relative clause, or a second external copy of the head NP, the externally headed structure is not available.

(132) a. Internally headed:…[$_{DP}$ the [$_{CP}$ book$_1$ that John read <book>$_1$]].

b. *Externally headed: …[$_{DP}$ the [$_{NP}$ book [$_{CP}$ ~~book$_1$~~ that John read <book>$_1$]]].

Another way of framing this fact is to say that modified concealed questions have an internal syntax that is much closer to an embedded question (which do not tolerate external heads) than a relative clause.

Thus an analysis of modified concealed questions should be able to capture the syntactic fact that the NP heads of modified concealed questions seem to originate inside the modifier and this structure does not tolerate a second, higher copy of the head.

Embedded wh-words:

Another fact about the internal composition of MCQS is that they do not allow embedded *wh*-words.

(133) a. I know the book that John read this summer
b. *I know the book that who read this summer.

From this, it seems that MCQs cannot be analyzed as embedded questions, complete with a standard question operator, which could license both the head "concealed *wh*" DP and a second *wh*-phrase. Similarly, an in-situ definite DP cannot get a concealed question meaning, suggesting that there is not a separate concealed-$_{Q\text{-operator}}$ which would license both the high and in-situ concealed DPs.

(134) [[I know the book that the boy read this summer]] ≠ [[I know which book which boy read this summer]]

This suggests that the operator that licenses the question-like meaning of the head DP is not an operator that can bind arguments inside the restrictor thereby licensing other (potential) wh-phrases.

Pair-List Readings:

Finally, I showed earlier that modified concealed questions give rise to pair-list readings when there is a quantifier embedded inside the modifier.

(135) I am curious as to the woman that every man loves.

a. Every man loves Marilyn Monroe	Single Individual
b. Every man loves his mother	Functional
c. John loves Mary, Bill loves Sue, and Dave loves Kate	Pair-List

I argue that, unlike the pair-list reading available for some relative clauses, the type of reading generated by MCQs is identical to the pair-list reading generated by embedded questions. This suggests that the mechanism that allows

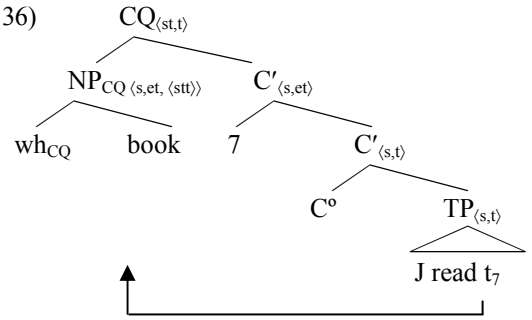
embedded questions to give rise to pair-list readings is also at work in the minimally different modified concealed questions.

Together, these facts nicely define the space of possible analyses of modified concealed questions. In some ways, they are syntactically and semantically very close to embedded questions, both in sharing the properties of being necessarily internally headed and in generating genuine pair-list readings, and at the same time are crucially different, in having additional constraints on possible-embedding verbs and disallowing in-situ *wh*-phrases. This suggests that neither an analysis of MCQs as questions nor as type-shifted relative clauses is adequate for capturing the facts about modified concealed questions.

2. The Account

In order to account for these facts about modified concealed questions, I propose a modified analysis of Nathan (2005), in which the Op_{CQ} combines first with (the in-situ) NP, which then moves to the specifier of CP, (136). This structure treats the concealed question operator as something closer to a covert *wh*-determiner, rather than a type-shifter, though the denotation remains basically identical, (137)[37].

(136)



(137) $[\![wh_{CQ}]\!] = \lambda Q_{s,et}.\ \lambda P_{s,et}.\ \lambda p_{st}\ .\ [\exists x_e\ .\ p = \lambda w\ .\ [P(w)(x)\ \&\ Q(w)(x)]]$ $\langle\langle se, t\rangle, \langle set,\langle st, t\rangle\rangle\rangle$

This gives rise to the final meaning of a modified concealed question as a proposition:

(138) $[\![the_{prop}\ [wh_{CQ}\ book]_1\ that\ John\ read\ t_1]\!] =$

$[\![wh_{CQ}\ book\ ]\!] =$
$\lambda Q_{s,et}.\ \lambda P_{s,et}.\ \lambda p_{st}\ .\ [\exists x_e\ .\ p = \lambda w\ .\ [P(w)(x)\ \&\ Q(w)(x)]]\ ([\![book\ ]\!]) =$
$\lambda P_{s,et}.\ \lambda p_{st}\ .\ [\exists x_e\ .\ p = \lambda w\ .\ [P(w)(x)\ \&$ x is a book in w$]]$ $\langle set, \langle st,t\rangle\rangle$

$[\![read]\!](wh_{CQ}\ book)(John) =$??? $\langle set, \langle st,t\rangle\rangle + \langle e,et\rangle$
$[\lambda y_e.\lambda x_e.$ x read y$]\ (\lambda P_{s,et}.\ \lambda p_{st}\ .\ [\exists x_e\ .\ p = \lambda w\ .\ [P(w)(x)\ \&$ x is a book in w$]])$
Type mismatching triggers movement

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[37] Note that for the current level of analysis, there is no important distinction between the operator combining with two intensions (as is written here), or the operator building in the type-shift, as below:

$[\![Wh_{CQ}\ ]\!]' = \lambda F_{et}.\ \lambda G_{,et}.\ \lambda p_{st}\ .\ [\exists x_e\ .\ p = \lambda w\ .\ [F(x)$ in w $\&\ G(x)$ in w$]]$ $\langle\langle e,t\rangle, \langle et, \langle st, t\rangle\rangle\rangle$

To remain most consistent with Nathan's formulation, I will continue to assume that the operator combines with properties, not predicates.

$\lambda z.[[\text{read}]]^{7\rightarrow z}(t_7)(\text{John}) =$
$[\lambda y_e.\lambda x_e.\ x \text{ read } y]^{7\rightarrow x}(t_7)(\text{John}) = \lambda z.\ \text{John read } z$ ⟨e,t⟩

$[[\text{wh}_{CQ}\ \text{book}\ ]]\ (\lambda x.\ \text{John read } x)^w =$
$\lambda P_{s,et}.\ \lambda p_{st}\ .\ [\exists x_e\ .\ p = \lambda w\ .\ [P(w)(x)\ \&\ x \text{ is a book in } w]](\ \lambda z.\ \text{John read } z)^w =$
$\lambda p_{st}\ .\ [\exists x_e\ .\ p = \lambda w\ .\ [\text{John read } x \text{ in } w\ \&\ x \text{ is a book in } w]]$ ⟨st,t⟩

$[[\text{the}_{prop}]](\lambda p_{st}\ .\ [\exists x_e\ .\ p = \lambda w\ .\ [\text{John read } x \text{ in } w\ \&\ x \text{ is a book in } w]]) =$
$[\lambda \mathcal{P}_{\langle st,t\rangle}\ .\ \iota p_{st}.\ \mathcal{P}(p)](\lambda p_{st}\ .\ [\exists x_e\ .\ p = \lambda w\ .\ [\text{John read } x \text{ in } w\ \&\ x \text{ is a book in } w]]) =$
$\iota p_{st}\ .\ [\exists x_e\ .\ p = \lambda w\ .\ [\text{John read } x \text{ in } w\ \&\ x \text{ is a book in } w]]$ ⟨s,t⟩

Note that this structure looks like the standard analysis of an embedded question, in that it assumes an NP with a complex (propositional level) head originating in argument position and movingpast TP.

(139) a. …know [which book$_7$ [Q John read t_7]]
b. …know [the [wh$_{CQ}$ book$_7$ [that John read t_7]]

However, it is different in two crucial ways. First (and by definition) is the difference in determiner: the embedded question has an overt *wh*-determiner, while the concealed question does not. Additionally, to get the correct question meaning (a set of propositions), an embedded question requires both a Q-operator and a *wh*-determiner, (Heim 2000), dividing the power to shift into sets of propositions and existentially bind into them, while a modified concealed question, under this analysis, puts all of the type-shifting power into the *wh*-determiner[38].

(140) $[[Q]] = \lambda p_{\langle s,t\rangle}.\ \lambda q_{\langle s,t\rangle}.\ q = p$ *maps propositions into a set of propositions*
$[[\text{which}]] = \lambda f_{\langle e,t\rangle}.\ \lambda P_{\langle e,\langle st,t\rangle\rangle}.\ \lambda p_{\langle s,t\rangle}.\ \exists x_e\ [f(x) = 1\ \&\ P(x)(p) = 1]$ *existentially binds into the set*

(141) $[[\text{wh}_{CQ}]] = \lambda Q_{\langle s,et\rangle}.\ \lambda P_{\langle s,et\rangle}.\ \lambda p_{\langle s,t\rangle}\ .\ [\exists x_e\ .\ p = \lambda w\ .\ [P(w)(x)\ \&\ Q(w)(x)]]$ *maps properties into props and existentially binds into the set*

Thus the analysis proposed here for modified concealed questions builds in both the fundamental similarity and fundamental dissimilarity to embedded questions, finding, I argue, exactly the balance needed to correctly predict the properties modified concealed questions discussed above.

2.1 External Distribution

This account gives an identical external treatment to CQs as Nathan (2005), treating bare concealed questions as sets of propositions ⟨s,st⟩ which combine with a maximality operator over propositions to give a proposition ⟨s,t⟩, and therefore retains the explanatory power of Nathan's original proposal, including capturing the facts about the distribution of MCQs under question taking verbs and their propositional behavior (PCQC), (142):

(142) [[the book that J read]]
= $[[\text{the}_{CQ}]](\lambda p_{st}\ .\ [\exists x_e\ .\ p = \lambda w\ .\ [x \text{ is a book in } w\ \&\ \text{John read } x \text{ in } w]])$
= $[\lambda \mathcal{P}_{\langle st,t\rangle}\ .\ \iota p_{st}.\ \mathcal{P}(p)](\lambda p_{st}\ .\ [\exists x_e\ .\ p = \lambda w\ .\ [x \text{ is a book in } w\ \&\ \text{John read } x \text{ in } w]])$
= $\iota p_{st}.\ [\exists x_e\ .\ p = \lambda w\ .\ [x \text{ is a book in } w\ \&\ \text{John read } x \text{ in } w]])$
= the unique proposition such that, for some *x*, the proposition expresses that *x* is the book John read.

[38] Note that Wh_{CQ} looks very close to the assumed meaning for *which* in a semantics that does not separated out Q-operator to account for multiple *wh*-words (Heim 2000):

$[[\text{which}]] = \lambda f_{\langle e,t\rangle}.\ \lambda P_{\langle s,et\rangle}.\ \lambda p_{\langle s,t\rangle}.\ \exists x\ [f(x) = 1\ \&\ p = \lambda w'.P(w')(x)]$

Specifically, it correctly predicts that modified concealed questions can combine only with question-embedded verbs that can also combine with propositions (objects of type ⟨s,t⟩):

(143) a. know$_{\langle st,et\rangle}$ [the book that John read]$_{\langle st\rangle}$
b. *wonder$_{\langle\langle st,t\rangle,et\rangle}$ [the book that John read]$_{\langle st\rangle}$

2.2 Modification

As in Nathan's (2005) analysis, the concealed question operator combines with two components of type ⟨s,et⟩: first, the head NP, and then the relative clause that it moves out of.[39] The concealed question head on its own receives only a denotation of type ⟨set,⟨st,t⟩⟩, (a function that maps properties to sets of propositions), which cannot combine either with a maximality operator or a proposition-embedding verb, correctly predicting that unmodified DPs cannot serve as concealed questions.

(144) a. $[\![\text{wh}_{CQ}\ \text{book}]\!] = \lambda P_{s,et}.\ \lambda p_{st}\ .\ [\exists x_e\ .\ p = \lambda w\ .\ [P(w)(x)\ \&\ x \text{ is a book in } w)]]$ ⟨set,⟨st, t⟩⟩
b. *know$_{\langle st,et\rangle}$ [the$_{\langle stt,st\rangle}$ [book]$_{\langle set,\langle st,t\rangle\rangle}$]

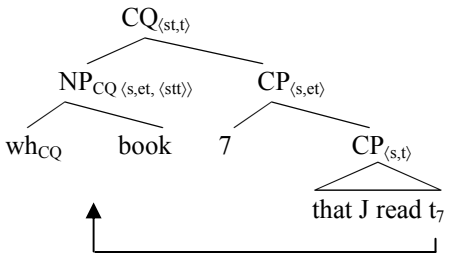
By treating the type-shifting operator as a determiner (which shares properties with quantifiers by operating over two sets), rather than as type-shifter attached to the relative clause, the account proposed here requires no additional specifications to explain the fact that modified CQ heads are necessarily modified, but doesn't commit to two fully distinct semantic components.

2.3 Internal Headedness

A unique advantage of the structure proposed in (136) is that it captures the internal syntactic facts about modified concealed questions without requiring any further stipulation. Specifically, while the *wh$_{CQ\text{-}operator}$* is compatible with an internally headed structure, when combined with an external copy of the concealed question head, it gives rise to fundamental structural problems, correctly capturing the empirical fact that MCQs are incompatible with an external head.

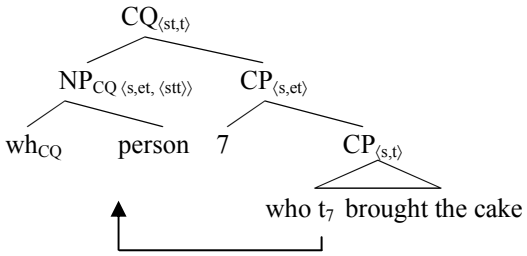
Assuming an internally headed structure makes the correct prediction both for object MCQs, (145), and subject MCQs, (146).

(145) (I am curious as to the) book that John read.



[39] However, like a quantifier moved out of object position (and unlike Nathan's original operator), *Wh$_{CQ}$* doesn't require that the two pieces be two fully separate syntactic components.

(146) (I am curious as to the) person who brought the cake.

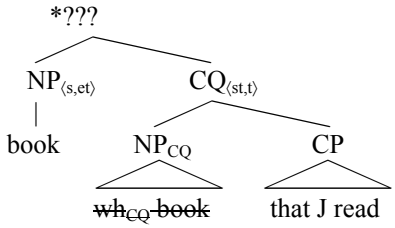


However, analyzing the same structures as externally headed relative clauses makes systematically bad predictions. To see that an externally-headed structure of MCQs is incompatible with *wh*$_{CQ}$, it is necessary to consider three cases[40] of an external headed analysis, one with a full copy of NP_{CQ} inside the relative clause and a bare NP outside, one with two full copies of the NP_{CQ}, and one with a bare NP inside the relative clause and a full copy of NP_{CQ} outside:

(147) a. book [[wh_{CQ} book]$_7$ that John read t_7]
b. wh_{CQ} book [[wh_{CQ} book]$_7$ that John read t_7]
c. wh_{CQ} book [book$_7$ that John read t_7]

In (147)a, the internal copy of the CQ head contains the wh_{CQ} operator, while the external copy is a bare NP. The complex CP (which now has a concealed question denotation) cannot combine with the higher copy of the bare NP, leading to a type-mismatch of ⟨s,et⟩ and ⟨st,t⟩. This (correctly) eliminates an analysis of modified concealed questions as having an internal NP_{CQ} with an external copy of the NP.

(147)a′



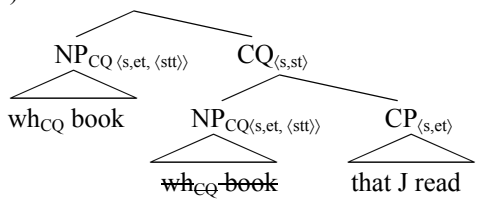
Similarly, in (147)b, both the internal and external copies of the head contain a copy of the wh_{CQ} operator. Because the type-shift from properties to propositions can only occur once, the second copy of the concealed question operator also creates a type-mismatch of ⟨s,et, ⟨stt⟩⟩ and ⟨st,t⟩.[41] This excludes an analysis of MCQs with a full copy of the NP_{CQ} head both inside and outside of the relative clause.

[40] There is another logical possibility, in which the relative clause has a single copy of the head NP outside of the relative clause, and an empty operator inside the relative clause. However, I follow Safir (1999), Sauerland (1998, 2002, 2004), Bhatt (2002), and Hulsey and Sauerland (2006) in assuming that this structure is not actually available.

This assumption is additionally supported by the binding facts I observe in chapter one, such that the DP head can be bound by elements inside the restrictor, a fact which would not be explainable in a purely-externally headed analysis)

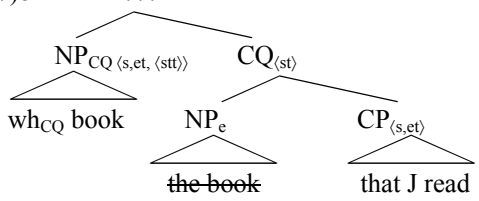
[41] Note that this is reminiscent of the semantic problem created when trying to analyze multiple-*wh* questions without assuming a separate question operator

(147)b′ *???



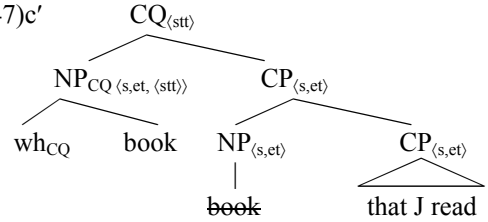
Note that a possible permutation of this structure is to assume that the lower copy of the NP_{CQ} shifts down into a denotation closer to a definite description[42], avoiding the problem of twice type-shifting into a concealed question. However, this structure also causes a type-mismatch, as the CP receives a basic propositional meaning, which is incompatible with the higher NP_{CQ} head, (147)b".

(147)b" *???



Finally, in (147)c, we have what seems to be the most promising way of constructing an externally headed MCQ, with a bare internal NP and an external NP_{CQ} head.

(147)c′



This structure doesn't give rise to any immediate type-mismatch, and in fact predicts the correct denotation for the concealed question. However, this structure fails to obey the licensing conditions for eliding (phonetically deleting) the lower copy of the NP, which stipulate that the elided constituent needs to have a parallel antecedent. *wh_{CQ} book* (assuming that NP_{CQ} is opaque for ellipsis licensing[43]) cannot serve as an antecedent for *book* (whether assuming strict identity (Sag 1976), focus identity (Rooth 1992), or entailment (Schwarzschild 1999)). Thus, though the structure in (147)c′ gets the type-based portion of the semantics correct, it also predicts that both heads will be spelled out and so the MCQ should be pronounced *the book book that John read*, which is clearly a bad prediction.

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[42] Note that the type assignments in tree seem to not allow the definite *the book* and the intensional relative clause to combine, but this is simply an artifact of typing the relative clause as type ⟨s,et⟩, rather than ⟨e,st⟩, a choice which is, for the current discussion, arbitrary (as is the choice to treat the relative clause as intensional, rather than extensional, see note 37)

[43] Generally, *wh*-NPs seem to not be suitable antecedents for NP ellipsis, suggesting the NP inside the wh-phrase is not accessible for the purposes of licensing ellipsis. Compare (a), in which the DP licenses NP ellipsis with (b), in which the *wh*-NP does not (thanks to Martin Hackl for pointing this out):

(i) Two different books on the solar system reference (the same) one on the Milky Way.
(ii) *Which books on the solar system reference (the same) one on the Milky Way?

Thus, a clear advantage of the proposed account over Nathan's original analysis (or any analysis that type-shifts the modifier), is that it predicts that modified concealed questions are necessarily internally headed.

2.4 Double-wh CQs

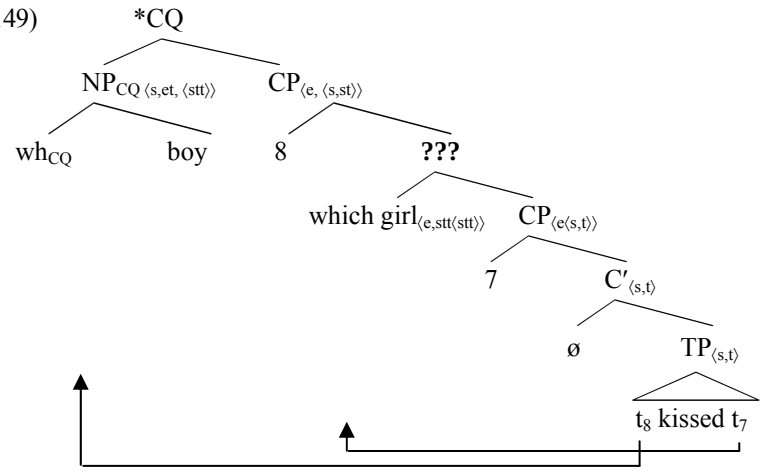
Another advantage of this account, especially over accounts that treat concealed questions as embedded questions, is that it correctly predicts the unacceptability of embedded *wh*-words, (148).

(148) a. *Mary knows the boy which girl kissed
b. *Mary knows the girl who kissed which boy

There could be two possible ways to try to recover the meaning of concealed questions with embedded *wh*-words, one which employs a question operator, and one which does not.

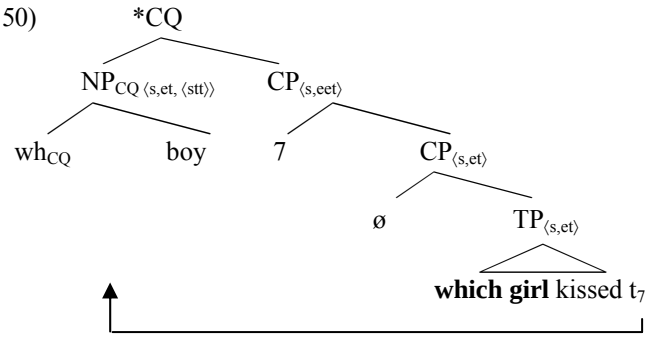
A structure without a Q-operator is not viable as the *wh*-phrase inside the modifier, which requires a set of propositions to bind into, will be sister to a property or open proposition, not a set of propositions, rendering the structure uninterpretable, (149).

(149)



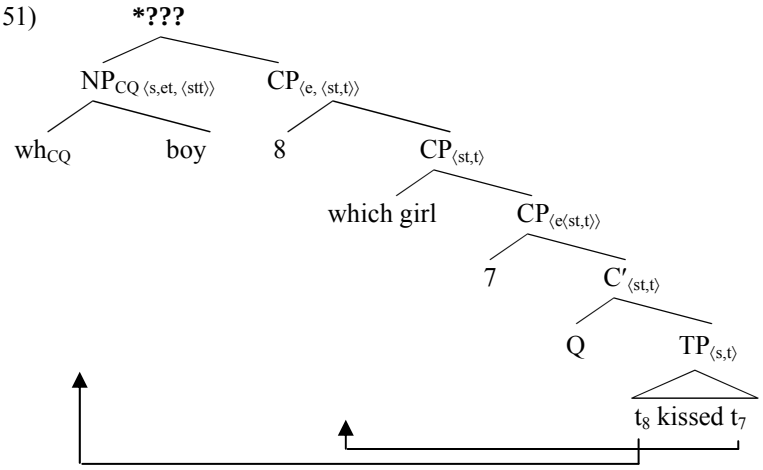
Note that this happens also in analyses that treat the Q-operator as a binder, with the *wh*-phrase acting as an in-situ predicate, as the *wh*-phrase would remain unbound, leading to a type-mismatch with the concealed question head, (150):

(150)



However, if, as in a standard multiple-*wh* question, a Q-operator is assumed to be in C^{o} (or if *which girl* is assumed to do the work of both Q and the *wh*-determiner), a similar semantic problem arises: both the Q-operator and the concealed question operator will try to map the denotation of TP into a set of propositions, creating a type mismatch between CP and the concealed question head, (151).

(151)



Thus, giving modified concealed questions a treatment that uses an operator like *wh$_{CQ}$* correctly predicts the fact that MCQs cannot host embedded *wh*-words.

2.5 Pair-List Readings

In the first section of chapter 3, I argue that modified concealed questions give rise to genuine pair-list readings. Moreover, I argue that an analysis that treats this purely as instance of quantifier movement over the CQ-head is incorrect – it is syntactically problematic and fails to distinguish between readings generated by different types of quantifiers. However, I will argue that the account put forward in Lahiri (2002) for pair-list readings can be straightforwardly extended to the analysis that I give here.

Recall the asymmetry in available readings for a quantificationally headed concealed question with an embedded universal subject, such as *every boy*, and one with an embedded modified number subject, such as *at least five boys*. The MCQ with a universally quantified subject can give rise to a reading in which John knows most of all of the boy-book pairs, (152)c. The MCQ with the modified number subject, however, cannot mean that John knows most of at least five of the boy-book pairs (meaning that he knows what at least four of the boys read), (153)c.

(152) John knows most of the books that every boy read
- a. John knows most of the books that were read by every boy
- b. John knows, for every boy, most of the books that he read
- c. John mostly knows, for every boy, which book he read

(153) John knows most of the books that at least five boys read
- a. John knows most of the books that were read by at least 5 boys
- b. John knows, for at least 5 boys, most of the books that he read
- c. *John mostly knows, for at least 5 boys, which book he read

This data is highly reminiscent of data observed by Lahiri (2002), in which embedded questions with quantificational adverbs show the same effect, such that those with a universally quantified subject allow the "most of the pairs" reading, while those with a modified numeral quantifier do not:

(154) John knows for the most part which books every boy read
  a. John knows most of the books that were read by every boy
  b. John knows, for every boy, most of the books that he read
  c. John mostly knows, for every boy, which books he read

(155) John knows for the most part which books that at least five boys read
  a. John knows most of the books that were read by at least 5 boys
  b. John knows, for at least 5 boys, most of the books that he read
  c. *John mostly knows, for at least 5 boys, which book he read

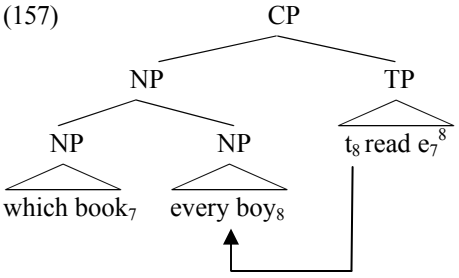
To account for these facts, Lahiri (2002) proposes a variation on absorption (modeled on Chierchia 1993, among others), in which the quantificational NP adjoins to the *wh*-phrase, and gets absorbed into a higher type, using the transformation rule in (156).

(156) $\lambda f_{whNP}.\ \lambda G_{\langle ett \rangle}.\ \lambda p_{\langle e,est \rangle}.\ \lambda P.\exists X_{\langle et \rangle}\ [W(G,X)\ \&\ P\ (\lambda Q.\ \exists x \in X\ [Q = \lambda p.\ \exists f_1 \in [X \rightarrow f]\ [p = \lambda w.[[TP]]]])]$,
where W(G,X) is X is a witness set of G.

This rule takes in the *wh*-NP, the moved quantifier, and the original TP, returning a higher order question with multiple layers of sets of propositions. Each of these sets is a sub-portion of the original question, and each has a separate (though overlapping) set of possible answers. Partitioning the question into subcomponents allows the question to be "quantified into" by quantifying over subquestions, rather than atomic parts. This correctly predicts both the basic pair-list readings for (154) and (155), and the discrepancy in the availably of the third reading, as universal quantifiers have unique witness sets (subcomponents) that modified numeral quantifiers don't.

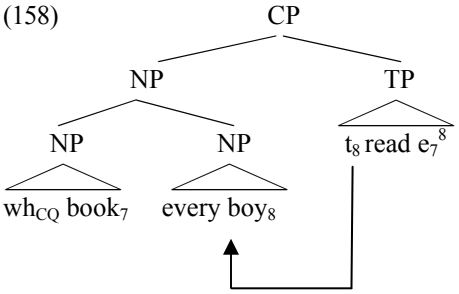
This transformational rule operates on a structure with a *wh*-NP in spec-CP and a quantifier which origins inside of the adjoined TP, and then moves also to spec-CP, leaving behind a trace and binding over the trace of the *wh*-NP.

(157)



The structure assumed here for modified concealed questions provides exactly the structured required for applying this transformational rule, (158). Note that this contrasts with Nathan's analysis, which provides neither the *wh*-head required for absorption, or the *wh*-trace inside the TP.

(158)



This correctly predicts not only that modified concealed questions have pair-list readings, but captures the facts that the pair-list readings for quantified concealed questions show the same asymmetry as in the cases with a quantificational adverb, (154) and (155). Moreover, this analysis generates the pair-list reading through absorption of the quantifier into the *wh*-head, rather than movement over a Q-operator, predicting correctly that is it necessary only to have a *wh*-phrase and a quantifier, not a separate question operator, to generate pair-list readings.

In this chapter, I first laid out the properties of modified concealed questions that should be accounted for in, including external distributional properties, internal syntactic properties, and internal semantic properties. I then developed a novel account of modified concealed questions, assuming a covert *wh*-determiner based on Nathan's type-shifting operator. I argue that analysis correctly predicts the set of properties of MCQs that were problematic for Nathan (2005), while keeping the original explanatory power.

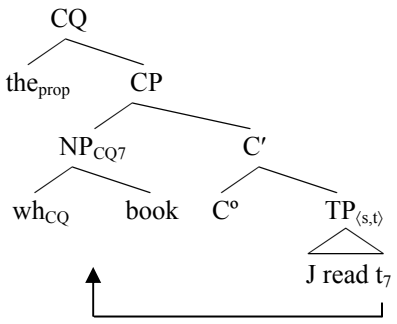
Conclusion

In this thesis, I presented an overarching framework in which I consider restrictive relative clauses, free relative clauses, embedded questions, and concealed questions to be members of a single class. The core underlying object of this class, I argue, is a CP that can vary in the type of determiner heading the host DP and availability of a question operator. Treating modified concealed questions as my test case, I find evidence to support this structure.

Specifically, I show that modified concealed questions exhibit a series of properties which are reminiscent of, but importantly not identical to embedded questions, including giving-rise to pair-list readings without allowing embedded *wh*-phrases. Similarly, modified concealed questions differ importantly from the minimally different relative clauses in not allowing an external copy of the host NP. Although it gets a number of external distributional facts correct, the account of MCQs in Nathan (2005) cannot account for the full range of properties discussed in this thesis.

To account for these properties, I propose a revision to Nathan's account, such that the type-shifting operator mapping properties to sets of propositions acts as a covert *wh*-determiner that combined with the in-situ host NP, and then moves (like a standard *wh*-NP) to spec-CP.

(159) [[the book that John read]]$_{CQ}$ =



This analysis correctly captures the empirical facts about modified concealed questions that I present here, without additional stipulation or undue machinery, and provides the first step into a full analysis of concealed questions, embedded questions, relative clauses, and free relatives.

References

Aoun, Joseph & Yen-hui Audrey Li. 1993. Syntax of Scope. The MIT Press, Cambridge, Massachusetts.

Bhatt, Rajesh (2002): 'The Raising Analysis of Relative Clauses: Evidence from Adjectival Modification', *Natural Language Semantics 10*: 43–90.

Boškovix, Želiko. 2001. On the Nature of the Syntax-Phonology Interface: Cliticization and Related Phenomena. North-Holland Linguistics Series: Linguistic Variations, Elsevier Science, Oxford.

Caponigro, Ivano. 2004. The semantic contribution of wh-words and type shifts: Evidence from free relatives cross-linguistically. In R. Young (ed.) Proceedings of SALT XIV, 38-55, Ithaca, NY: CLC Publications, Cornell University.

Caponigro, Ivano., and M. Polinsky. To appear. Almost everything is relative in the Caucasus. Proceedings of SALT XVIII.

Caponigro, Ivano, and Maria Polinsky: to appear, 'Relatively Speaking (in Circassian),' Proceedings of WCCFL XXVII.

Chierchia, Gennaro. 1993. Questions with Quantifiers. Natural Language Semantics 1,181-234.

Chomsky, Noam. 1993. A minimalist program for linguistic theory. In: Ken Hale and Jay Keyser (ed.) The View from Building 20. MIT-Press, Cambridge, Mass.

Dayal, Veneeta. 1995. "Licensing *any* in non-negative/non-modal contexts". In Mandy Simons and Teresa Galloway (eds.), *SALT V*, 72-93

Engdahl, Elisabet. 1980. The syntax and semantics of questions in Swedish. Unpublished Ph.D.-Dissertation, University of Massachusetts, Amherst.

Fiengo, Robert and Robert May. 1994. Indices and Identity. MIT-Press, Cambridge, Mass.

Fox, Danny. 2002. Antecedent contained deletion and the copy theory of movement. Linguistic Inquiry 34:63–96.

Grimshaw, Jane. 1979. "Complement selection and the lexicon". *Linguistic Inquiry* 10: 279-326.

Groenendijk, Jeroen and Martin Stokhof. 1984. Studies on the Semantics of Questions and the Pragmatics of Answers. PhD dissertation, University of Amsterdam.

Hamblin, Charles L. 1973. "Questions in Montague English". Foundations of Language 10: 41-53.

Harris, Jesse. 2007, Revealing Concealment: A (Neuro-)Logical Investigation of Concealed Questions, MA thesis, University of Amsterdam

Heim, Irene. 1994. "Interrogative semantics and Karttunen's semantics for *know*". In Ronna Buchalla and Anita Mittwoch (eds.), *IATL 1*, 128-144.

Heim, Irene. 2000. "Notes on Interrogative Semantics".

Hulsey, S. & U. Sauerland. 2006. Sorting out relative clauses. Natural Language Semantics 14, 111-137.

Jacobson, Pauline 1995. Quantification in Natural Languages. In Emmon Bach, Eloise Jelinek, Angelika Kratzer & Barbara H. Partee (eds.). Quantification in Natural Languages. Kluwer, Dordrecht.

Karttunen, Lauri 1977. Syntax and Semantics of Questions. Linguistics and Philosophy 1.3-44.

Marantz, Alec. 1984. On the Nature of Grammatical Relations. MIT Press, Cambridge, Mass.

Krifka, Manfred.: 2001, 'Quantifying into question acts', Natural Language Semantics 9, 1–40.

Lahiri, Utpal. 2002. Questions and answers in embedded contexts. Oxford University Press.

Lahiri, Utpal. 2000. "Lexical selection and quantificational variability in embedded interrogatives". Linguistics and Philosophy 23: 325-389.

Lasersohn, Peter. 2005. "The temperature paradox as evidence for a presuppositional analysis of definite descriptions". Linguistic Inquiry 36: 127-134.

Marantz, Alec. 1984. On the Nature of Grammatical Relations. Cambridge, MA: MIT Press.

Nathan, Lance. 2005. On the interpretation of concealed questions, Ph.D. thesis, MIT

Pesetsky, David. 1991. Zero Syntax vol. 2: Infinitives. Unpublished manuscript available at http://web.mit.edu/afs/athena.mit.edu/org/l/linguistics/www/pesetsky/infins.pdf .

Romero, Maribel. 2005. "Concealed questions and specificational subjects". Linguistics and Philosophy 28.

Safir, Kenneth. 1999. Vehicle change and reconstruction in A-bar chains. Linguistic Inquiry 30: 587-620.

Sag, Ivan. 1975. Deletion and Logical Form, Ph.D. thesis, MIT

Sauerland, Uli. 1998. The Meaning of Chains. Unpublished Ph.D. dissertation, Massachusetts Institute of Technology, Cambridge, Mass.

Sauerland, Uli. 2000. Two structures for English restrictive relative clauses. In: Mamoru Saito et al. (ed.), Proceedings of the Nanzan GLOW, 351–366. Nanzan University, Nagoya, Japan.

Sauerland, Uli. 2002. Unpronounced heads in relative clauses. In: Kerstin Schwabe and Susanne Winkler (ed.), The Interfaces, Deriving and interpreting omitted structures, 205–226. John Benjamins, Amsterdam, The Netherlands.

Sauerland, Uli. 2004. The interpretation of traces. Natural Language Semantics 12:63-127.

Schwarzschild, Roger. 1999. 'GIVENness, $AVOID_F$ and Other Constraints on the Placement of Accent'. *Natural Language Semantics* 7: 141-177.

Sharvit, Yael. 1999. Functional relative clauses. Linguistics and Philosophy 22: 447–478.

Simík, Radek. 2008. The source of wh-morphology in questions and relative clauses. Sylvia Blaho, Camelia Constantinescu, and Erik Schoorlemmer (eds). Proceedings of ConSOLE 15, 273-294 Published online. ISSN 1574-499X.

von Stechow, Arnim. 1990. Layered Traces. Paper presented at the Conference on Logic and Language, Revfülüp, Hungary.

Szabolcsi, Anna. 1997. Strategies for scope taking. In Anna Szabolcsi (ed). Ways of Scope Taking, pp.109–154. Dordrecht: Kluwer.

Vergnaud, Jean-Roger (1974): French Relative Clauses. PhD dissertation, MIT