On the Syntax and Semantics of Heim's Ambiguity

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1. Introduction

1.1. Heim's ambiguity

Let's suppose that John and Mary are the final two contestants competing on the game show *The Price is Right*.[1] The host Bob Barker shows each contestant a list of prices and products. Each contestant guesses a price-product pair and then writes it down in secret.[2] The catch is that if they guess the same price-product pair, then both forfeit, and if one can guess what product the other guessed, then she takes all the other player's points. The players hand in their replies and Bob Barker announces (1). What does he mean? Has John won the game or do they both forfeit?

(1) John guessed the price that Mary guessed

Heim (1979) observed that sentences like (1) are ambiguous: one reading is about the price that John and Mary both guess (in which they both forfeit), the other is about what price John has guessed in answer to the question "What price does Mary know?" (in which John wins). I follow Heim and others and call the first interpretation Reading A, and the second, Reading B (also known as the "meta-question" interpretation, see Romero (2005)).

(2) John guessed the price that Mary guessed

    A. John and Mary's guesses are independent; John and Mary needn't have guessed anything about the other, but they must at least have guessed the identity of the same price (or price-product pair).

    B. John's guess is about Mary's guess, though he needn't have guessed anything more about prices himself.

Now here's a curious bit of new data: when example (1) appears in Antecedent Contained Deletion (ACD) contexts, Reading B disappears.

(3) John guessed the price that Mary did

    A. John and Mary guessed the same price

    B. # John guessed the answer to the question "What price did Mary guess?"

This paper attempts to explain why Reading B vanishes in (3). I argue that a *structural* ambiguity underlies Heim's ambiguity, which is usually cashed out primarily in *interpretive* terms. In particular, I claim that Readings A and B are assigned different relative clause structures in the syntax:

(4) **Heim's ambiguity reflects structural ambiguity:** Reading A is derived from a "Matching" relative clause structure and Reading B from a "Raising" one.

In addition, I provide evidence that corroborates the claim in (4), and show that numerous, independently developed diagnostics of Matching and Raising structures pattern as (4) predicts. I conclude by speculating on how the different relative clause structures yield different representations for interpretation.

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[1]Special thanks go to Rajesh Bhatt and Kyle Johnson for their invaluable assistance. Also, many thanks to Ilaria Frana, the UMass Semantics Reading Group, and the WCCFL 2008 audience.

[2]There is a certain ambiguity or vagueness surrounding terms like *price* – whether a currency amount (e.g., $2.99) or the argument of the relational noun (e.g., *the price of milk*) is at issue. I hope to avoid this thorny issue by simply taking contexts in which we need only consider the 'price-product' pair.

1.2. Two analyses of relative clauses

There is a long standing debate about the proper analysis of English relative clauses. The debate centers around the verdict to the following two questions: is there an internal head represented within the relative clause, and, if so, is this internal head derivationally related to the external head? In this paper, I follow a line of work that answers the first question in the affirmative. Consequently, I do not discuss the perhaps most familiar analysis in which a relative clause contains *only* an external head (see Bhatt (2002) for review). What is left open is the answer to the second question, that is, whether the external head and internal head are *derivationally related* (the Raising Analysis; Brame (1968), Vergnaud (1974), Kayne (1994), Bianchi (1999), and Bhatt (2002)) or *derivationally distinct* (the Matching Analysis; Lees (1960), Chomsky (1965), and Sauerland (1998)).

In the Raising analysis (RA), the external and internal head of a relative clause head are one and the same: the internal head *raises* through the relative clause CP to appear as the external head in surface syntax. In contrast, the Matching analysis (MA) proposes that the external and internal heads are derivationally distinct; they instead enter into a *matching relationship*, depicted by the box in (5b), in which the internal head elides (see Sauerland (1998) for details). The structures predict different possibilities for reconstruction – a covert reconfiguration at Logical Form (LF) of an element to a position along a movement chain. In the RA, the external head may reconstruct to a position within the relative clause. In the MA, it may not. For both accounts, I assume that the determiner on the head is merged separately (Bhatt, 2002), and that *copies* not traces constitute the elements in movement chains (the Copy Theory of Movement). The indices i and j are used as a shorthand to indicate the derivational origins of the head – when the internal and external head have different origins, they appear with distinct indices.

(5) John guessed [the [price [that Mary guessed]]

    a. $[_{DP}$ price$_i$ $[_{C'}$ ~~price~~$_i$ $[_{C^0}$ that $[_{IP}$ Mary guessed ~~price~~$_i$]]]]   (Raising)

    b. $[_{DP}$ ⟦price$_j$ $[_{C'}$ ~~price~~$_i$⟧ $[_{C^0}$ that $[_{IP}$ Mary guessed ~~price~~$_i$]]]]   (Matching)

Another Matching structure is available in which the relative clause CP is Late Merged (Lebeaux, 1988) to the external head. I assume that the following derivation of the Matching structure (5b) is available in at least Extraposition and ACD contexts: the external head *price*$_j$ is merged externally to the relative clause (i). It then undergoes 'Phonological' Quantifier Raising (QR) to adjoin to a position above the VP (ii).[3] The CP *that Mary guessed price*$_i$ is Late Merged to the head (iii) and the internal head *price*$_i$ raises to the Spec of CP, deleting under identity with the external head (iv).

(6)   i. $[_{VP}$ guessed $[_{DP}$ the $[_{NP}$ price$_j$]]

      ii. $[[_{VP}$ guessed $[_{DP}$ the $[_{NP}$ price$_j$]]] ~~price~~$_j$]

     iii. $[[_{VP}$ guessed $[_{DP}$ the $[_{NP}$ price$_j$]]] ~~price~~$_j$ $[_{CP}$ that Mary guessed ~~price~~$_i$]]

    iv. $[[_{VP}$ guessed $[_{DP}$ the $[_{NP}$ price$_j$]]] ~~price~~$_j$ $[_{CP}$ ~~price~~$_i$ that Mary guessed ~~price~~$_i$]]

The important point is that only in the RA is the internal copy of *price*$_i$ derivationally related to the relative clause head *price*$_i$. As such, only the RA accounts for reconstruction of the head into CP internal positions. Among the environments that appear to demand such an analysis are Idioms, and readings of Amount relatives and Superlative modifiers which appear to scope under other scope-bearing units within the relative clause.

Idioms, as argued by Bhatt (2002) and Hulsey & Sauerland (2006), reflect a Raising structure because idioms are licensed locally within a domain of special meaning (Marantz, 1984). In (7), for example, the idiomatic interpretation of *make headway* is licensed only when its constituent parts are merged or interpreted together (7a). In other words, the parts of an idiom behave as one semantic unit; if the parts are separated, then the idiomatic interpretation is absent (7b). In (7c), the relative clause head *headway* must have originated as the sister to *make* in order to maintain the idiomatic meaning, and so the relative clause in (7c) demands a Raising structure.

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[3]'Phonological QR' is used loosely here to mean that the copy that was raised by QR is not the copy that is pronounced – see, for instance, Bobaljik (1995). In this case, the pronounced copy is the matrix copy.

(7) **Idioms:** must be merged/interpreted together

    a. We made headway

    b. # The headway was satisfactory

    c. The headway that we made was satisfactory

<div align="right">(see Bhatt (2002) and Hulsey & Sauerland (2006))</div>

Low readings of amount relatives and superlative modifiers are also thought to provide support for the RA. For ease of exposition, I take the case of superlative modifiers, as more or less the same can be said about amount relatives.

(8) **Superlative Modifiers:**

    The first book that John said that Tolstoy had written.   (Bhatt, 2002)

    High: The first book x, s.t., John said that Tolstoy had written x

    Low: The x s.t., John said that the first book that Tolstoy had written was x.

Bhatt (2002) observed that relative clauses with superlative adjectives are ambiguous. In the High reading, it is the *order of saying* that matters. Suppose that in 1990 John said Tolstoy wrote *Anna Karenina*, and that in 1991 John said Tolstoy wrote *War and Peace*. Then the adjective *first* modifies the times that John said Tolstoy wrote some book x, and the relative clause refers to *Anna Karenina*. In the Low reading, however, only the *order of writing* is at stake. Suppose we are in the same context as above, except that John also claims that the very first book written by Tolstoy was *War and Peace*. In this case, *first* modifies the order of books written by Tolstoy, and the relative clause refers to *War and Peace*. In the Low reading, *first* is interpreted as part of John's report and must therefore be interpreted within the relative clause at LF by reconstructing to a position along the movement chain within the relative clause. And only if we have a Raising analysis, in which there is a derivational chain between positions external and internal to the relative clause, will there be a position within the CP to which the external head may reconstruct.

However, the RA is not always available. Hulsey & Sauerland (2006) suggest that the MA is forced in environments in which the relative clause head is separated from the rest of the relative clause. One such environment is when the head is extraposed over a temporal adjunct (9).

(9) **Extraposition:** Idioms cannot be extraposed across temporal adjuncts.

    a. *Mary praised the headway last year that John made

    b. Mary praised the pot roast last year that John made   (Hulsey & Sauerland, 2006)

In (9a), an adjunct *last year* intervenes between the relative clause head and the rest of the clause. Hulsey & Sauerland (2006) argue that the relative clause head originates outside the relative clause in order to be realized to the left the adjunct, forcing a Matching structure. Idioms in such environments (9a) are ungrammatical because the Matching structure separates parts of the idiom when it is illicit to do so. In contrast, (9b) shows that when the relative clause head bears no special idiomatic relationship to the rest of the relative clause, temporal adjuncts are licensed. This contrast suggests that Extraposition contexts serve to distinguish Matching from Raising structures.

Following Fox (2002), another context that forces Matching over Raising structures is Antecedent Contained Deletion (ACD), so-called because the syntactic constituency that would serve as an antecedent to the elided VP contains the elided VP itself, as in (10).

(10)   John [$_{VP}$ read every article that Mary did ~~read article~~]

        ellipsis (over the elided VP)   *antecedent*

Fox (2002) assumes that ACD environments only allow Matching structures. As such, the elided VP is not positioned within the antecedent VP, but rather outside of it in the Late Merged CP. For space considerations, I simply adopt Fox's analysis and assume that relative clauses in ACD environments are Matching structures.

A recent trend in syntax (Hulsey & Sauerland (2006), as well as Bhatt (2002)) unifies the data accounted for by the RA and MA by adopting the idea that *both* analyses are available in grammar (see also Carlson (1977)). And since the data that Matching and Raising account for are largely complementary, the two analyses can often be distinguished by the environments listed in Table 1.

Diagnostic	Matching	Raising
Idioms	*	✓
Amount Relatives	*	✓
Superlative Modifiers (Low)	*	✓
Extraposition of Adverbs	✓	*
ACD Environments	✓	*
Superlative Modifiers (High)	✓	*

Table 1: Diagnostics for Raising versus Matching Structures

From the assumption that certain environments force either a Matching or Raising analysis, I now attempt to show the dual sides of (4), namely that (i) whenever Matching is forced, only Reading A of Heim's ambiguity survives, and (ii) when Raising is permitted, so too is Reading B. From this, I will conclude that Readings A and B are structurally linked to Matching and Raising structures, respectively.

2. Heim's ambiguity, revisited

Numerous analyses of Heim's ambiguity have been proposed as part of a semantic analysis of *concealed questions*, which are generally defined as determiner phrases (*the price of milk*) whose meanings may be paraphrased as an indirect identity question (*what the price of milk is*):[4]

(11)   a. John knows/guessed/disclosed the price of milk   (Concealed Question)
       b. John knows/guessed/disclosed what the price of milk is   (Indirect Question)

No account of concealed questions yet developed has tried to capture Heim's ambiguity in *structural terms* (though see Harris (2007) for a precursor to this account). I claim that it is crucial to do so, and that each reading is tied to a unique structural configuration. The strategy to establish this claim is as follows: first I show that Reading A is the sole surviving reading when only the MA is present, and then I show that Reading B appears just when the RA is available.

2.1. Reading A lives on Matching structures

I first present two sources of evidence to support the idea that Reading A lives on a Matching structure. I discuss the distribution of Readings A and B in ACD contexts and then show that the pattern extends to Extraposition environments.

2.1.1. Antecedent Contained Deletion

As noted, Reading B of Heim's ambiguity (1B) disappears in ACD contexts (12).

(12)   John guessed the price that Mary did
       A. John and Mary guessed the same price
       B. # John guessed which number it was that Mary guessed

Assuming that relative clauses in ACD contexts are Matching structures (Fox, 2002), there is now a straightforward explanation of the distribution: Reading B is unavailable simply because it depends on a Raising structure, a structure which is independently banned from ACD environments.

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[4]There is an extensive, and rapidly growing literature, within semantics on concealed questions which I cannot review here. The term was perhaps first coined by Baker (1968), and developed by Grimshaw (1979) and Heim (1979). Recent work on the topic includes Romero (2005, et seq), Nathan (2006), Frana (2007), Harris (2007), Schwager (2007), and Roelefson & Aloni (2008).

2.1.2. Extraposition past temporal adjuncts

If Reading A depends on the Matching Analysis, we expect that only Reading A is licensed in Extraposition contexts. Example (13) shows that this expectation is borne out, and (14) shows that when temporal adjuncts appear in ACD contexts, only Reading A is available.

(13)   John guessed the price yesterday that Mary guessed
   A.   ✓ John and Mary both knew the same price yesterday
   B.   # John knew which price Mary knew yesterday   (Extraposition forces MA)

(14)   John guessed the price yesterday that Mary did
   A.   ✓ John and Mary both knew the same price yesterday
   B.   #John knew which price Mary knew yesterday   (ACD/Extraposition force MA)

That Reading B should be absent from Extraposition contexts is completely expected under the claim that Reading B depends on a Raising structure. In the next section, I provide additional evidence that the distribution patterns as expected under hypothesis (4).

2.2. Additional Evidence from Reconstruction

Let's assume, following Bhatt (2002) and Hulsey & Sauerland (2006), that Raising structures are compatible with (at least) a Low reading, and Matching structures with (at most) a High reading. The hypothesis in (4) predicts that only Low readings are compatible with Reading B, and that only High readings are compatible with Reading A. Then we also expect that Low readings for Amount Relatives and Superlative Adjectives are incompatible with ACD and Extraposition contexts.

To illustrate, suppose that John and Mary are back on the *Price is Right* circuit and that Mary has become hesitant about making too many guesses. What does Bob Barker mean by (15)? Have John and Mary guessed the same few prices (High/Reading A)? Or has John guessed the few prices that Mary has guessed (Low/Reading B)? Both readings appear to be available:

(15)   John guessed the few prices that Mary guessed
   A.   ✓ John and Mary both guessed the same prices and they guessed only a few prices
   B.   ✓ John guessed which prices Mary guessed, and Mary guessed only a few prices

However, the Low reading (Reading B), in which the adjective *few* scopes to a position within the attitude report, disappears in ACD (16a) and Extraposition contexts (16b).

(16)   a.   John guessed the few prices that Mary did   (✓A/ #B)
          b.   John guessed the few prices yesterday that Mary guessed   (✓A/ #B)

A similar pattern obtains with Superlative Modifiers: the Low reading of the adjective vanishes once placed in an ACD or Extraposition context. On one reading of (17), the highest price that John has guessed happens to be same price that Mary has guessed, say $500 for a washing machine (Reading A). On the other, John has guessed a price for which he thinks Mary has guessed, and this price is the highest one she has guessed (Reading B). Again, the Low reading (Reading B) is absent in ACD contexts.

(17)   a.   John guessed the highest price that Mary guessed   (✓ A/ ✓ B)
          b.   John guessed the highest price that Mary did   (✓ A/ # B)

These patterns are entirely expected if our hypothesis (4) holds true. In summary, the data distribute along the following lines: whenever the Matching Analysis is forced, only Reading A is present, and whenever the Raising Analysis is available, so too is Reading B. The diagnostics have been collected in Table 2 below.

Despite having defended an argument that aligns the two readings of Heim's ambiguity with distinct relative clause structures, we have thus far ignored a most pertinent question: *why* should these two readings live off of distinct structures? Or, as I shall address the issue, what is it about the *structures* that gives rise to the relevant interpretations?

Diagnostic	Matching	Raising	Reading A	Reading B
Idioms	*	✓	N/A	N/A
Amount Relatives (Low)	*	✓	*	✓
Superlative Modifiers (Low)	*	✓	*	✓
Extraposition of Adverbs	✓	*	✓	*
ACD Environments	✓	*	✓	*
Amount Relatives (High)	✓	*	✓	*
Superlative Modifiers (High)	✓	*	✓	*

Table 2: Summary of Distribution of Readings A and B

3. A Semantic Analysis

Recall that the Matching structure (18A) contains both an *external* head $price_j$, demarcated by the boxed region, and an *internal* relative clause head $price_i$, whereas the Raising structure (18B) contains only the latter. The examples below depict the desired configurations of Matching and Raising structures at LF:
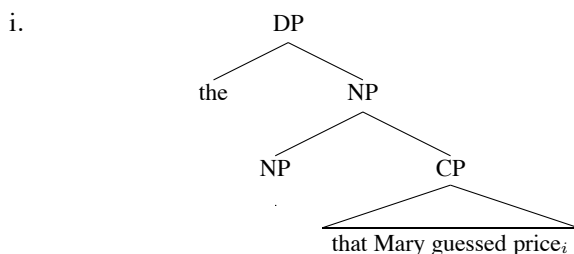
(18)   John guessed [the price that Mary guessed]

A. **Reading A:** John and Mary guessed the same price   (Matching)

   i.
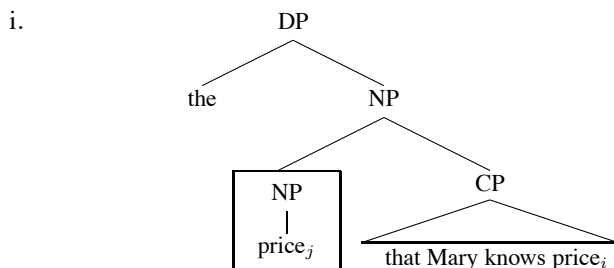
   ii.   John guessed ιx[price x such that Mary guessed price x]   (*2 heads at LF*)

B. **Reading B:** John guessed the answer to "What price did Mary guess?"   (Raising)

   i.

   ii.   John guessed ιx[Mary guessed price x]   (*1 head at LF*)

So far, however, neither the MA nor the RA force the LF structures above. I pursue the idea that reconstruction of the internal head is driven by situation binding; in short, while in both analyses the internal head must reconstruct in order for its situation variable to be properly bound within the embedded clause, only in the MA is there an external head bound at LF within the matrix clause.

3.1. Situation variables in relative clauses

Following Percus (2000) and others, I assume that structures contain variables over *situations* (see Kratzer (2008) for overview). Verbs and nouns may project their own situation variables, which are subject to a Binding Theory (19). Intensional verbs associate with λ-terms that bind situation variables.

(19)   **Generalization X:** The situation pronoun that a verb selects for must be coindexed with the nearest λ above it.   (Percus, 2000)

To see in greater detail how situation binding will affect our structures, let's first consider (20). Percus (2000) explains the two readings of (20a) by appealing to two different ways the situation variable of the DP *my brother* can be realized. (The symbol $\mathbb{S}$ is used here as a meta-variable and is not strictly speaking said to be in the representation of (20a)). On the *opaque reading*, John believes of the individual Ben Harris that he is an economist, but he needn't believe that Ben is my brother. In other words, the term *my brother* is evaluated with respect to the actual situation (s_0), bound by λ_0. So, for the opaque reading, $\mathbb{S} = s_0$.

On the *transparent reading*, John believes that I have a brother and he is an economist. He may hold incomplete or incorrect beliefs about the identity of my brother. The term *my brother* is evaluated with respect to John's belief states (s_1). And so, for the transparent reading, $\mathbb{S} = s_1$.

(20) a. John thinks my brother is an economist

b.
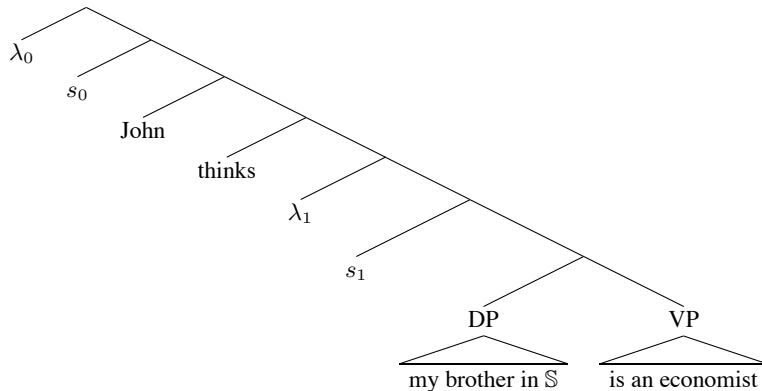
    i. s_0: part of the actual world, adjoined to the sentence root

    ii. s_1: part of John's belief states, selected by the matrix verb

    iii. if $\mathbb{S} = s_0$, $\llbracket$my brother$\rrbracket$ is evaluated with respect to the actual world   (*transparent*)

       if $\mathbb{S} = s_1$, $\llbracket$my brother$\rrbracket$ is evaluated with respect to John's belief states   (*opaque*)

In terms of Heim's ambiguity, the MA differs from the RA in that it contains an external head which is bound transparently to the matrix clause, an idea that is sketched in more detail below.

3.2. Deriving Heim's ambiguity

I keep the semantics of CQs a little vague for two reasons: firstly, I think that the general conclusion about the *structural* underpinnings of the two readings holds irrespective of the semantic analysis. Secondly, the semantics of CQs is a complex issue. To adequately defend a detailed semantic analysis requires far more space than I have here. Several good analyses have already been proposed, some of which may be compatible with the syntactic mapping I am presently defending. In light of these caveats, I posit a $\mathcal{Q}$ operator instead of worrying about a precise interpretation for CQ nominals. But while I won't commit to an exact meaning for $\mathcal{Q}$, I nevertheless cash out its intuitive effect as a paraphrase: $\mathcal{Q}$(DP) may be paraphrased as 'how to identify DP' or 'what DP is.'

The central structural difference between Readings A and B can now be localized to whether the situation associated with relative clause head is bound by a λ-binder in the matrix clause at LF. The important distinction is that while the internal head *must* reconstruct beneath the embedded verb to be properly λ-bound, only the MA contains a distinct external head with a situation variable that cannot be bound by the embedded verb. However, this distinction does not reduce to the transparent/opaque binding of *price*, for the most deeply embedded *price* is bound within the embedded clause, and is always *opaque* as a consequence. Intuitively, the fact that the situation associated with the internal *price* is embedded under Mary's belief states corresponds to the fact that – in both the readings – Mary attempted to directly identify some price. It is only in Reading A that John must have also attempted to identify this same, *transparently* bound price.

In order to give an analysis of the structures in question, let's assume that $\mathcal{Q}$ is merged between a verb and its complement. Further, suppose that there are two instances of $\mathcal{Q}$: one in the matrix clause, and
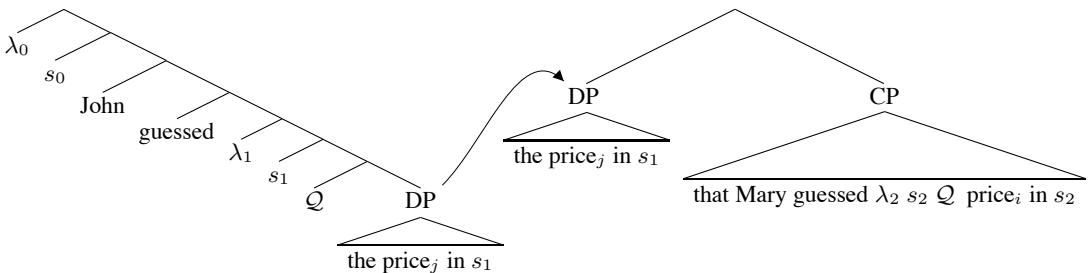
one in the embedded clause. It is also assumed that the *matching relation* ensures that the external and internal heads are at least form identical (Sauerland, 1998). Although the details remain speculative, this identity requirement perhaps translates into an identity between the external and internal representations of *price*, at least at some level of representation.

Assuming a derivation of the Matching structure that involves Late Merger as discussed in (6), Reading A is derived as follows. First, the external head is merged in the matrix clause (21.i). Then, Phonological QR raises the DP to a position above the VP (though I won't commit to exactly where) in which the relative clause CP is Late Merged as its sister (21.ii). There are two representations of *price*, evaluated at possibly distinct situation variables – while the external head's situation variable is bound by the matrix verb, the internal head is bound by the embedded verb. Late Merger of the complement ensures that the internal head is never in a position to be bound by the matrix λ.

(21) **Reading A:** John and Mary guessed the same price.

      i. External Head Merged in Matrix   ii. QR of External Head, Late Merger of CP

λ_0

s_0

John

guessed

λ_1

s_1

$\mathcal{Q}$ DP

the price$_j$ in s_1

DP   CP

the price$_j$ in s_1 that Mary guessed λ_2 s_2 $\mathcal{Q}$ price$_i$ in s_2
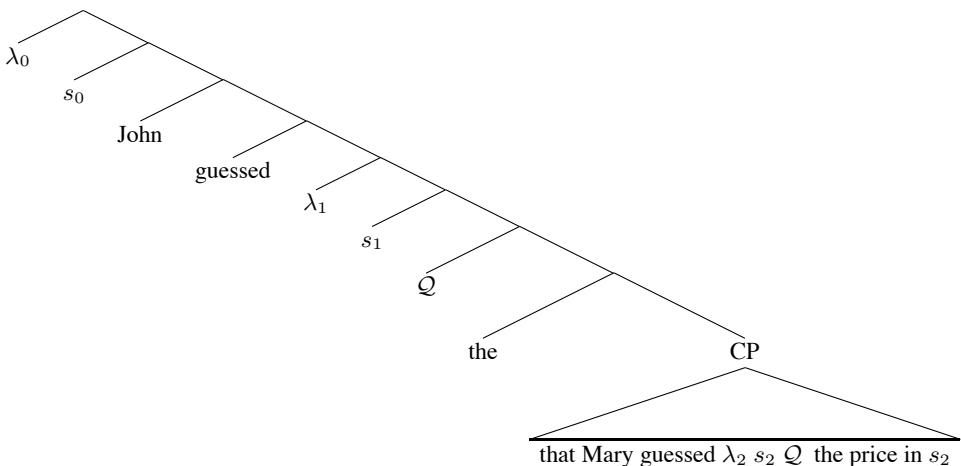
The resulting semantic representation of (21) is shown roughly as in (22). The boxed region depicts the semantic contribution of the external head. Although some situation variables have been omitted in (22) and (24) for expository reasons, I assume that $\mathcal{Q}$ returns something more or less propositional.

(22)   guessed(j)($\mathcal{Q}(\iota x.[$ $\boxed{\text{price}_j x \text{ in } s_1}$ $\wedge$ guessed(m)($\mathcal{Q}$(price$_i x$ in s_2))]))

    Paraphrase: John guessed how to identify the price$_j$ x in s_1 for which Mary guessed how to identify the price$_i$ x in s_2, where *price$_j$ x* is identical to *price$_i$ x* from the Matching Relation.

Reading B is computationally simpler: the internal head raises through the relative CP to the external head position. There is only *one* representation of *price* in this derivation, and it must be bound within the embedded clause.

(23) **Reading B:** John guessed the answer to the question "What price did Mary guess?"

λ_0

s_0

John

guessed

λ_1

s_1

$\mathcal{Q}$

the   CP

that Mary guessed λ_2 s_2 $\mathcal{Q}$ the price in s_2

The semantic representation of Reading B (23) is depicted as (24), again omitting some situation variables. Crucially, there is no correlate to the external head in (22) in this representation.

(24)   guessed(j)($\mathcal{Q}(\iota x.[$guessed(m)($\mathcal{Q}($price$_i$ x in s_2))]))
>   **Paraphrase:** John guessed how to identify the x such that Mary guessed how to identify the price$_i$ x in s_2

In the Reading B, there is only a single representation for the head *price*, and so there is no possibility of indexation by different situation variables. And herein lies the difference between Reading A and B, a difference made directly available by the structures from which they are derived.

4. Summary

In this paper I claimed that Heim's ambiguity, usually treated in purely *semantic* terms, in fact also reflects a structural ambiguity between Matching and Raising relative clause structures. The main evidence was garnered from the fact that only Reading A survives in ACD and Extraposition contexts. Further evidence consistent with this approach was provided from the reconstruction of amount relatives and superlative adjectives. To show how the different derivations could provide insight into the semantic ambiguity, I sketched how a semantic account with situation variables in the syntax might make use of the different structures. In short, a Concealed Question operator $\mathcal{Q}$ – the semantics of which were left unspecified – was posited at two positions in the tree in *both* interpretations: above the relative clause and above the direct object of the embedded verb. The different structures provide different semantic arguments to $\mathcal{Q}$ at LF, resulting in different interpretations. In Reading A, there are two representations of the relative clause head, indexed to potentially different situations variables, while in Reading B there is but one representation of the head and it is λ-bound within the relative clause.

The structural difference between the two readings has indeed told us something interesting about Heim's ambiguity, namely that the crucial difference between Reading A and B is the presence of an external head, which is made available to LF only in the Matching Analysis. It may be worthwhile, if beyond the scope of this paper, to determine whether this structural difference manifests in interpretive differences elsewhere.

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