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A method of interpreting prenominal possessives:incorporating the generative lexicon and type-shifting

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1. Introduction

Using Pustejovsky's lexical semantic theory, according to which word senses have a rich internal structure (Pustejovsky (1995)), Jensen & Vikner (1994), and Vikner & Jensen (1999), present a unified formal semantic analysis of the pre-nominal genitive construction by describing the interaction between syntax (especially the notion of compositionality) and the lexicon. This paper is a discussion of some of their ideas and findings in this area as well as a presentation of an alternative way of calculating the semantic type of the possessive *s*.

The genitive construction is problematic for linguists[1], because it involves a relation which is not explicitly expressed and it seems to allow for a great variety of relational interpretations. Consider the following examples (Jensen & Vikner 1999).

(1a) *The girl's brother*   inherent relation (kinship)
(1b) *The girl's nose*   part-whole relation
(1c) *The girl's car*   ownership (control relation)
(1d) *The girl's poem*   agentive relation

Vikner & Jensen (1999) make an significant distinction between default, (lexical), and non-default, (pragmatic), interpretations. Lexical interpretations are 'privileged' in the lexical semantics of the relevant words, in the sense that the information needed to compute these interpretations is incorporated in the lexicon. The construction of pragmatic interpretations, on the other hand, cannot be carried out on the basis of lexical knowledge alone, but depends on essentially on pragmatic knowledge and discourse knowledge.

I believe that claims about the nature of a semantic theory are of parallel importance to the claims of 'generative' approaches to linguistic phenomena. A number of meta-theoretical criteria come to mind:

    i)   a semantic theory must be descriptively adequate in that the statements made within the theory are empirically supported, i.e. full data coverage.

    ii)   a serious theory should also give us some grounds from which we can make certain predictions with respect to the interpretation of natural language expressions.

    iii)   explanatory adequacy should also be a goal so that we can come to an understanding of the acquisition process in the child with respect to the mental lexicon and the possible interpretations that seem available to the young child in the course of its development.

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[1] Consider the following quote from Partee & Borschev (2000a: 1):
'The terminology surrounding "possessives" and "genitives" is confusing, since the correspondences among morphological forms, syntactic positions, grammatical relations, and semantic interpretations are complex and debated, and vary across languages.'
In this paper, we will attempt to focus on only the semantic interpretations available in cases where the 'phrase internal' grammatical relation is kept constant, i.e. we will only concern ourselves with prenominal possessive constructions where the possessor is animate.

In this paper I will concentrate ourselves on point (ii) above. On looking into *generative lexicon theory* (henceforth *GLT*), it is my belief that this approach is a viable method for us to 'maintain a compositional semantics while accounting for the different manifestations of an expression in a fairly principled way' Pustejovsky (1993:76).

Without anticipating the discussion that follows, I will argue that the interpretations given above are all lexical rather than pragmatic. Four types of lexical interpretation for prenominal genitives are argued for[2]: inherent relation, part-whole relation, agentive relation, and control relation, as is indicated in examples (1a-d). The central question raised here is where do we get these interpretations from? The rest of this paper will try to show where and how.

2. Generative lexicon theory

Pustejovsky's (1995) theory of lexical structure assumes four levels of lexical representation:
  i) argument structure,
  ii) event structure,
  iii) qualia structure, and
  iv) lexical inheritance structure.
Two of these are relevant to the analysis that follows. Put briefly[3], argument structure specifies the number and type of the logical arguments that a lexical item carries, and how they are realised syntactically, (cf. the notion of grammatical valency). Qualia structure represents the essential attributes of an object as defined by the lexical item in question (Pustejovsky 1995:85-86). It does so by specifying four essential aspects of a word's meaning, which are called qualia roles. These roles are listed as the following;

Qualia Theory

- CONSTITUTIVE: the relation between an object and its constituent parts or between an object and what that object is logically part of.
- FORMAL: that which distinguishes it within a larger domain.
- TELIC: its purpose and function.
- AGENTIVE: factors involved in its origin or 'bringing it about'.

In the model proposed by Pustejovsky, qualia roles are said to be of particular importance in explaining the ways in which humans interact with the world, and form the basis of the ways in which humans systematise their perception of the world. That is why qualia roles are deemed crucial to describing what is essential to the lexical semantics of human language. The information contained in the qualia roles may alternatively be represented in the form of meaning postulates but they are not since we would then be faced with a plethora of meaning postulates and in the spirit of theory –internal economy this is something best avoided. Qualia role theory may be considered as a theory for organising and constraining the use of meaning postulates in formal semantics. This is why Pustojevsky's *GLT* can be considered attractive for studies in formal semantics. Qualia roles can be seen as partial functions from word senses in which variables, (partial senses or the lexical item), are bound and may be used in linking

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[2] I will primarily discuss this construction where the possessor is human. Of course other construction possibilities exist, but they add a number of complications that will but detract from the central ideas presented in this paper. It is my intention to cover these other cases in future work.

[3] Event structure and the lexical inheritance structure will not be discussed here.

up the different modes of representation, i.e. across the argument structure via the qualia structure (see page 11 below for more discussion on this point).

Vikner & Jensen (1999) claim that the prenominal genitive always expresses a relation between two entities, and that the head noun in the genitive construction must be relational in order to allow for the relational interpretation of the construction.

At this point, the difference between unmodified relational and sortal nouns should be commented on. Sortal nouns are nouns which characterise the entity denoted by the noun filling its representational role. Relational nouns, on the other hand, have an additional argument place; i.e. they stand in a certain relation to some other entity. Formally, (see Partee & Rooth (1983:362) re. Montague's type theory and Bach (1989:74-75)), this may be represented as:

Sortal noun	$\lambda x[\mathbf{thing}(x)]$
e	e.g. *car*

Relational noun	$\lambda x\, \lambda y[\mathbf{thing}(x)\, \&\, \boldsymbol{R_i}(x,y)]$
<e,<e,t>>	e.g. *teacher*

When the second noun in the NP(gen) (i.e. the head noun) construction is sortal, it is coerced into the higher type by means of meaning-shifting operators. These operators coerce sortal nouns into becoming relational, according to the selectional restrictions specified by the modifying noun in the NP(gen). Pustejovsky (1993:83) formulates a basic definition of coercion:

Type coercion: A semantic operation that converts an argument to the type which is expected by a function, where it would otherwise result in a type error.

The option of type coercion is available in the revised version of Montague semantics, which allows multiple semantic types for syntactic categories. If we look again at examples (1a-d), we can see that the only inherently relational noun in the set is *brother*, all other nouns are coerced to become relational.

To summarise Vikner & Jensen (1999) they make three claims:
(i)   the genitive always requires a relation, and
(ii)   this relation is made available by the head noun.
(iii)   if the head noun is non-relational i.e. sortal, a relational meaning is brought out via the lexical structure by coercion.

This allows them to set a possible range of lexical interpretations for pre-nominal genitives, as is indicated in the following table.

TABLE 1. Interpretation matrix for **[N₁'s N₂]** (from Jensen & Vikner 1999:26)**.**

N₂		N₁ (N's)	Interpretation
Relational		Meets selectional restrictions of N	Inherent relation
Non-relational	Marked as possible part in Constitutive role of N₂	Meets restrictions on whole in Constitutive role of N₂	Part-whole relation
	Artefact	Meets selectional restrictions on agent position in N₂'s agentive relation	Agentive relation
	Physical object	Animate	Control relation

If the conditions indicated in columns 1 and 2 are satisfied, the model predicts that the reading in column 3 is possible (Jensen & Vikner 1999:26). A consequence of this type of analysis is that a given genitive construction may have more than one lexical interpretation (i.e. it is ambiguous), if more than one source for the genitive relation is available in the construction in question. For example, if N₁ denotes a human being and N₂ a physical artefact, there will be two possible interpretations: an agentive interpretation and a control interpretation, (as in *Mary's book* – 'a book that Mary wrote' or 'a book that Mary owns'). Both of these interpretations are then to be considered as lexically specified, not pragmatically, and thus the construction is polysemous in the same way as a single word can be polysemous, thereby showing how complex this construction is and the demands made on a model which has the ambition of relating aspects of form and meaning with respect to the genitive. Much of the discussion that follows will be arguments in support of the interpretations outlined in table 1.

By using *GLT*, the claim is that an account of the different manifestations of a number of genitive expressions can be given in a fairly principled way by appealing to the notion of type coercion described therein. In the next sections I will argue that type coercion is a phenomena that has empirical grounding and then go on to discuss this phenomena in more detail in the light of what we observe in a number of prenominal genitive constructions where the possessee head nominal is modified by certain adjectives.

3. Type coercion

I repeat the definition given above:

> **Type coercion**: A semantic operation that converts an argument to the type which is expected by a function, where it would otherwise result in a type error.

One objection that has been raised against this operation is that it appears a bit too '*deus ex machina*' for it to come into any serious discussion. I believe that this is not the case however,

not unless we think of the notion 'selectional restrictions' as being a similarly 'artificial device'. Consider:

(2) The boy thought about it
(3) #[4]The rock thought about it

The verb THINK in this simple transitive use is restricted in that it selects for an animate (usually a higher 'rational' animate) as its first argument. Thus **think'**(x,y), such that x = [+ANIMATE].
Cf. the following paradigmatic arrangement of sense relations:

(4a) The boy thought that it was strange
(4b) The horse thought that it was strange
(4c) ?The canary thought that it was strange
(4d) ??The ant thought that it was strange
(4e) #The ameoba thought that it was strange

If we are to postulate that (4c-e) are semantically bad because of selectional restrictions *vis à vis* ['higher-level animate'] re. its first argument, then it is as reasonable to include type-coercion as another mode of explanation re. possible/impossible interpretations[5] from compositionally well-formed phrases/utterances.
Let us look to the verb WANT to see some evidence of type-coercion which seems as empirically supportable as the notion of selectional restrictions. In the following sentences we observe that the verb takes different complements[6].

(5a) Bill wants John to drink a beer
(5b) Bill wants John to have a beer
(5c) Bill wants to drink a beer
(5d) Bill wants to have a beer
(5e) Bill wants a beer

One way of explaining this is to say that in English we have three different entries in the lexicon which are homophones, and that they are different in that we see that they take

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[4] I use the following conventions in mark sentences/phrases: ? and ?? = for increasing semantic/pragmatic anomalousness, # = serious problems with obtaining an interpretation, and * = grammatically ill-formed.

[5] Of course it is possible to come to some interpretation of any utterance with strong enough pragmatic/contextual priming. But the scope of these interpretations lies outside the immediate interests of a *lexical* semantic theory *per se*. What I are interested here is the lexical interpretations that are obtainable. I do not suggest a 'context-free' interpretation however; the relevant expressions are in a co-text, and thus appeal to principles of co-compositionality. They are lexically and syntactically determined. This is the interaction believed to be held between the lexicon and syntax (cf. the Fregean Principle). We observe lexical items in particular syntactic constructions, and come to an interpretation of those lexical items. The syntactic construction enables these sense relations to emerge, but they, (particular aspects of a concept which give rise to possible interpretations), have to be part of the content of the lexical item in the beginning for them to emerge – we are interested in testing this, and establishing, on empirical grounds, what particular senses (or partial senses) are actually part of a word's entry in the lexicon.

[6] I have excluded constructions such as *This beer wants drinking(* by Bill)/That shirt wanted ironing (*by your mother)/* in my discussion, despite being of interest. Although they are not discussed in Pustejovsky (1995) they are not central to the point on hand and will only complicate the exposition. However, they do serve to be another type of example demonstrating the interplay between the lexicon and syntax such that we see that this use of the verb demands the present participle of an event verb as its complement, cf. #*This beer wants to be drunk*, #*That feeling wanted to be experienced* and #*The beer wanted John to drink it*.
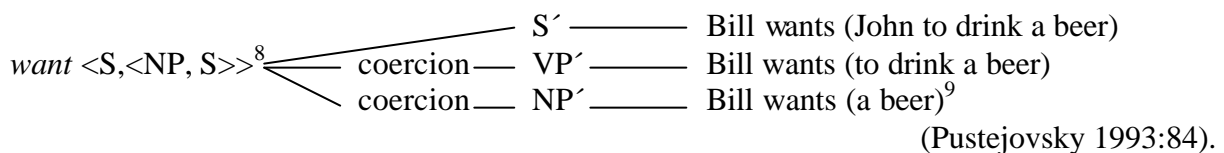
different complements. This state of affairs however fails to capture the basic similarities that we immediately see in (5a-e) and is not very appealing in terms of Occam's Razor, nor is it in any way intuitive. If we were to assume a new lexical entry every time a verb appears in a different syntactic environment/configuration then we would just be describing some sense enumeration lexicon and would not be able to account for the novel use/interpretation of words or the indisputable fact that the use of the verb *wants* in (5a-e) are related, cf.

(5a') Bill wants John to drink a beer in the bar
(5c') Bill wants to drink a beer in the bar
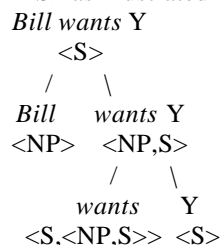(5e') Bill wants a beer in the bar

We interpret that the beer is to be drunk in the bar, not that the mental state of wanting or WANT (+ complement) takes place in the bar. Another alternative, and more attractive, is to allow for a principled explanation for these different uses of the same verb. This is where the notion of type coercion can come into play. Consider the meaning of the verb *want*: it denotes a mental state characterised by a desire or longing for a state of affairs that does not pertain[7] (I cannot want to drink a beer if I am already drinking a beer, (I may enjoy it (or not)), just as I cannot lack that which I already have). Looking at the types of complement the *want* may take we observe the following:

$$want <S,<NP, S>>^8$$

coercion	S´	Bill wants (John to drink a beer)
coercion	VP´	Bill wants (to drink a beer)
coercion	NP´	Bill wants (a beer)[9]

(Pustejovsky 1993:84).

Assuming the notion of selectional features, we may say that they are lexically specified on the verb. I will also say that one of the selectional features is the specification of the type the complement a verb must have for it to be interpreted. This being the case, we see that it is the case that the verb *is* interpreted – but it has differently typed complements you may point out:- it is here that type coercion comes into play. Changing the type of a lexeme/lexical string results in a different interpretation of that lexeme/lexical string. Thus in the cases with *a beer* above, we do not interpret the expression literally as denoting an entity (that is what beer is) but rather an event in which that entity is an argument. This occurs because of its role as the complement of the verb WANT according to the notion of co-compositionality (i.e. the

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[7] Cf. *I want what I can not have, and this pains me* and *I love what I can not have,...* both mental verbs.

[8] *Want* is represented as type <S,<NP, S>> since it takes <S> as its complement and returns <NP,S> which in turn is taken by a <NP> to return <S> as illustrated in the following tree diagram:

```
            Bill wants Y
               <S>
              /    \
        Bill      wants Y
        <NP>     <NP,S>
                   /   \
               wants    Y
           <S,<NP,S>>  <S>
```

[9] There seems to be a potentially fatal counter-argument against the analysis given here. If we add an adverbial to these sentences, e.g. *quickly*, we come to different interpretations. For example, if we hear *John wants a beer quickly*, we do not assume that he wants to drink the beer quickly, but rather he wants to take possession of the beer immediately. If we hear *John wants to drink a beer quickly*, we do not interpret this as he wants it immediately, but rather that the event of drinking the beer will not take very long. We will not discuss this further here, and continue with the understanding given by the data in (5) above.

complement of the verb needs to be typed as some state of affairs, not an entity). We can say that this is part of the lexical entry for WANT. Given this type-shifting scenario in terms of co-compositionality we can come to a principled explanation of the interpretation of the whole sentence by appealing to the Telic qualia role associated with the lexical entry for *beer*. The following sentences will demonstrate that this is not just an *ad hoc* explanation. Consider the verb PUT. The 'direct object' complement of the verb needs to be of a type $<e,t>,t>$[10] and not some state of affairs.

(6) Bill put [a beer] on the bar
(7) *Bill put [to drink a beer] on the bar
(8) *Bill put [John to drink a beer] on the bar

In the examples in (5) above, we could substitute [*to drink a beer*] and [*John to drink a beer*] for the nominal [*a beer*], but this is not possible in (6-7). Thus, it seems that the verb PUT is not a verb that can type-shift its complement.[11] This shows that type-coercion does not occur 'across-the-board' in an uncontrolled fashion, but is sensitive to the lexical specifications incorporated in the selectional restrictions featured by each lexical entry. This a direct result of allowing a richer representation of a lexical item's structure to subsumed in one's theory of lexical semantics.[12]

Further support is given to the observations above if we argue that we may *raise* the semantic type of a verb's complement, so that the complement assumes the same type of the verb's default complement type, but not *lower*[13] its semantic type feature. Thus, states of affairs can not be lowered by type-coercion as demonstrated in the examples with PUT, thus further constraining the operation of type-coercion and as a consequence raising this notion's theory-internal status as an descriptive/explanatory phenomena.

Returning to cases where a noun is interpreted as an event in which the object denoted by that noun is an argument, we would like to constrain the number and nature of events that are interpreted. These events are partial functions of the word's senses found in the qualia structure in *GLT*. The elements found in the qualia structure and the relationships that hold between them determine the lexical interpretation of nouns in a similar way by which the list of arguments (with their type-specifications) determine the meaning of a verb (Pustejovsky 1993: 86). The quale are structured in that argument constants and variables, and other information from other parameter lists (e.g. the event structure), can be bound across different sub-parts of the quale parameters in a particular lexical entry. Orthogonal Parameter Binding (Pustejovsky 1995: 68) is a mechanism which enables these different pieces of information to be subsumed into a single formal expression. By setting up an orthogonal matrix in this manner we can derive denotations (i.e. interpretations) from partial word senses

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[10] In the Montague tradition we give a uniform treatment of noun phrases as $<<e,t>,t>$, i.e.

Bill $\lambda P[P(j)]$
a girl $\lambda P \exists x[\mathbf{girl}(x) \& P(x)]$
every girl $\lambda P \forall x[\mathbf{girl}(x) \rightarrow P(x)]$.

[11] This fact will need to be indicated in the structured representation, (with its attendant consequences), of the lexical entry for PUT in *GLT* which is a demonstration of how the theory is primarily empirically based.

[12] After this paper's initial submission, one of the editors of this journal raised the interesting question (one of many others) of how we are to account for verbs that can be used both intransitively and transitively as in *I sang* and *I sang a lullaby*. Unfortunately I cannot account for these examples at the present moment. However I do see that the possible complements that this verb takes is restricted in that the complement NP must have in its Telic role the content 'to be sung'. Thus we see that, whilst *I sang a lullaby/song* are semantically coherent, *I sang *a novel/*a traffic sign/* a paper on possessives* are strikingly odd. As a tentative explanation, we notice that in none of the odd sentences can we reasonably say that 'to be sung' is part of the Telic role for these nouns.

[13] This is my own understanding of the parts of the theory that I have read so far. This is not to say that semantic-type lowering is disqualified in other discussions

since the variables can be bound across the different modes of representation. The components in the matrix are the partial word senses, the determinant that obtains would be the interpretation of that lexical entry in the particular environment it finds itself.

Lets us look to the determination of interpretations of nominals and what a lexical theory should see as its purpose. Firstly, notice that any one nominal expression may have a wide range of possible interpretations. Take the noun CAT for example, it can be used variously to refer to:

- a domestic pet (*Felis catus*)
- a wild animal (genus *Felis*)
- a female malicious gossip
- a man (cf. *a cool cat*)
- some violently disturbing new element (*a cat among pigeons*)
- someone who plays with another person in a cruel, teasing way (*cat and mouse*)
- someone who is uneasy or agitated (*a cat on a hot tin roof*)
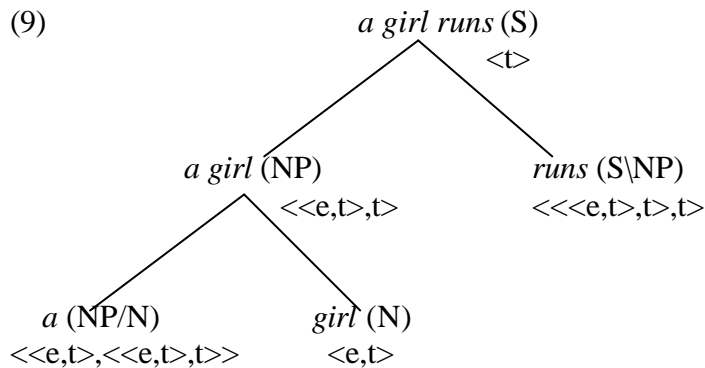- a secret (*let the cat out of the bag*)

and so on.

These interpretations, though perhaps related to some or other aspect of a literal interpretation of the word CAT in different ways, are obtained via the context in which we find the word. In the idiomatic, proverbial-type expressions we may say that it is by some convention that we variously assign the interpretation 'a secret', 'a cruel person', 'an agitated person' and so on. But where did these conventions come from? Are these original idiomatic interpretations purely arbitrary, or is there some aspect in the semantic structure of the word CAT which allows for these interpretations? I believe that in many cases this may indeed be so. What we observe from the data is that a particular nominal expression can be interpreted in many (often superficially divergent or unrelated) ways, but also that the linguistic content in which the nominal finds itself may determine the interpretation that obtains.

In line with many other lexical semanticists we will distinguish between two species of interpretations: i) interpretations that are lexically determined, and thus predictable in terms of a serious lexical semantic theory, and ii) interpretations that are pragmatically determined.

4. A categorial translation of 's

In this section I will present a categorial grammar translation, i.e. a typed expression for the possessive *'s* morpheme. As a introduction to this section I will first give a very simple categorial tree analysis for the sentence *A girl runs* and then proceed to give the same type of analysis for the possessed noun phrase *a girl's brother*. I will then end up with a typed expression for *'s* . In this paper, I will follow Jensen and Vikner's (1994) proposal that the semantic label which is assigned to *'s* in this analysis remains constant even when the head of the possessed noun phrase is a sortal noun. In assuming that the prenominal possessor phrase has the same type regardless of whether the head of the possessed noun phrase is sortal or relational will of course result in a type-error for the whole possessive phrase. Then, the lexicon (as outlined in *GLT*), is burdened to provide an argument type on the possessed noun phrase which will match the demands made on it by the possessor noun phrase. As the reader can predict by now, a type-shifting operation will come into play where the partial senses of the noun (as listed in the qualia for that noun) in the possessed noun phrase will motivate an expression of the correct type.

For the sentence *A girl runs* the following mapping of syntactic constituents and semantic type labels is proposed:
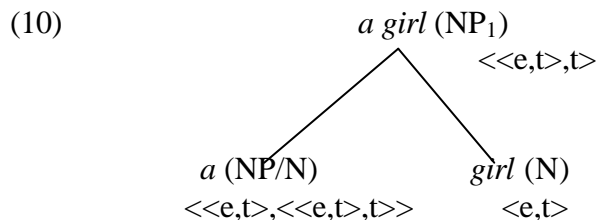
(9)

```
                        a girl runs (S)
                            <t>


            a girl (NP)              runs (S\NP)
            <<e,t>,t>               <<<e,t>,t>,t>


     a (NP/N)            girl (N)
<<e,t>,<<e,t>,t>>         <e,t>
```

The sentence (S) is said as having a possible truth value <t>. *A girl* is translated as a NP which is taken by the intransitive verb *runs* as its argument to produce the truth conditional sentence. The indefinite article is a function which takes a one-place predicate *girl* as its argument to produce a generalised quantifier. *Girl* is translated as a one-place predicate, i.e. x is a *girl* iff it has the properties if being a girl: $\lambda x[girl'(x)]$.

Using the type of reasoning which was used to set the above up, we will give a mapping of the syntactic and semantic structure of the possessive noun phrase *a girl's brother*. We will proceed in stages so as to show where the translations were derived. Assume the following syntactic structure:
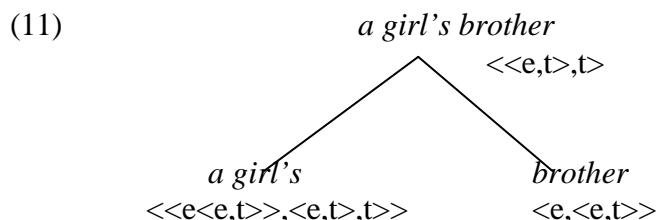
[NP$_{(possessive)}$ [PossessorP [NP$_1$ [*a* [NP$_1$ *girl*]] '*s*][NP$_2$[NP$_2$ *brother*]]][14]

We show the NP$_1$ *a girl* first:

(10)

```
                    a girl (NP₁)
                       <<e,t>,t>


        a (NP/N)                girl (N)
   <<e,t>,<<e,t>,t>>             <e,t>
```

This is the same as the example above, (9), in [*a girl*] *runs*.

Returning to the top of the tree (see (15) below), the next step we can show is the combining of *a girl's* + *brother* (i.e. PossessorP + NP$_2$):

(11)

```
                    a girl's brother
                       <<e,t>,t>


        a girl's                    brother
  <<e<e,t>>,<e,t>,t>>              <e,<e,t>>
```

Brother is a relational noun and as such, its semantic type label is that of a two place predicate i.e. <e,<e,t>>. Inherent to being a *brother* is that one is in a *brother-relationship* with another
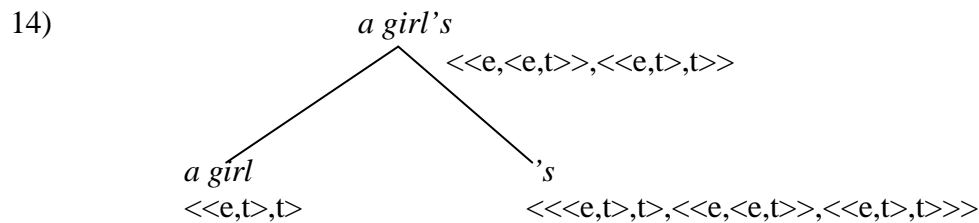
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[14] I have included *brother* in its own NP$_2$ since it is possible to insert a determiner before the possessed nominal, e.g. *the boy's every wish*. This is problematic but not fatal for the discussion that follows.

person: $\lambda x[\lambda y[\text{brother'}(x)(y)]]$. This is not true of sortal nouns; being a *girl* for example makes no inherent reference to any other person or entity except that person of whom *girl* is predicated of. Consider the following two sentences:
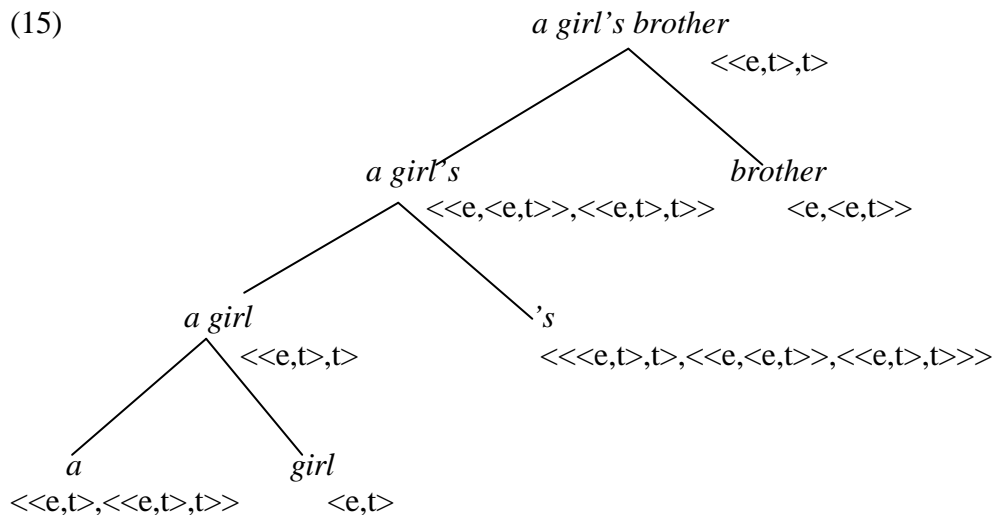
(12) I was sitting in the park and a boy walked past.
(13) I was sitting in the park and ?a brother walked past.

A relational noun, such as *brother*, is conceptually incomplete if it is not placed in some relationship. We could also say that *walk* has the selectional restriction where its subject must be a generalised quantifier, not a two-place predicate.

Now that we have the top two nodes and the bottom two nodes of the tree we can calculate the type label for *'s*. We see that *'s* takes a noun phrase (generalised quantifier) as its argument and returns *a girl's* with the type <<e,<e,t>>,<<e,t>,t> (as calculated in (11)). Thus, *'s* is a function over generalised quantifiers of the type <<e,t>,t>, e.g. *a girl*: $\lambda \boldsymbol{P} \exists x[\textbf{girl}(x) \& \boldsymbol{P}(x)]$.

14)

a girl's
<<e,<e,t>>,<<e,t>,t>>

a girl
<<e,t>,t>

's
<<<e,t>,t>,<<e,<e,t>>,<<e,t>,t>>>

Thus, we come to a translation of *'s* as being of the type <<<e,t>,t>,<<e,<e,t>>,<<e,t>,t>>>[15]. Below, the whole syntactic/semantic tree for the expression *a girl's brother* is reproduced.

(15)

a girl's brother
<<e,t>,t>

a girl's
<<e,<e,t>>,<<e,t>,t>>

brother
<e,<e,t>>

a girl
<<e,t>,t>

's
<<<e,t>,t>,<<e,<e,t>>,<<e,t>,t>>>

a
<<e,t>,<<e,t>,t>>

girl
<e,t>

---

[15] This is in fact exactly the same typed expression that is proposed by Vikner & Jensen (1999:13) although I have used a rather different line of approach to the calculation of this expression than they did. Thus we arrive to the same result, but by different paths of reasoning.

5. Approaching an interpretation of the prenominal possessive

In this section I will focus primarily on presenting a number of different examples of the prenominal possessive and discussing some of the lexically determined interpretations that obtain in the light of *GLT*. We will also discuss some examples which include the adjectives *favourite*, *best*, and *former* since they are interest in supporting or modifying some of the interpretations that we get from *GLT*. I will look to the interpretations labelled 'inherent relation', 'part-whole relation', 'agentive relation' and 'control relation' in turn and give some examples.

'Inherent relation' makes reference to prenominal possessive constructions where the possessed head nominal is inherently a relational noun (as discussed above). Nouns such as *brother*, *cousin* (and other kinship terms), *edge*, *top* and *surface*, for example are all inherently relational nouns and as such we would expect this to be listed in their entry in the lexicon. When preceded by an animate possessor the interpretation that obtains is just that which is denoted by the relational noun, such that *Bill's cousin* refers to the person who is in a 'cousin relationship' w.r.t. Bill, i.e. a relative who has descended from one of his common ancestors. Again, it should be pointed out that this relationship is explicitly specified in the lexical entry for *cousin*. Being a relational noun it conforms to the type we have discussed in (15) above, that is: <e,<e,t>>. No type shifting or meaning shifting occurs. The denotation of *cousin* remains as it is expected in this context.

In the 'part-whole relation' appeal to a type-shift operator can be made when certain nouns that are considered logical parts of other objects. It is here that the Constitutive role, as defined in the noun's Qualia structure, is of import, i.e. what is appealed to is what the relevant object (the possessed head nominal) may be part of. The Constitutive Quale is defined as 'not only to the parts or material of an object, but defines, for an object, what that object is logically part of, if such a relation exists. The relation **part_of** allows for both abstractions.' (Pustejovsky 1995: 98). Consider the noun *nib*. The possessive *the pen's nib* is interpreted as 'the nib that is part of the pen' i.e. the part that is placed on paper if one is to write with that pen in the conventional manner, and no other part. Now *nib* is not an inherently relational noun like *aunt* or *bottom*, but we still interpret *nib* as having a particular **relationship** *vis à vis* a pen. It is here that the Constitutive role supplies us (as interpreters) with the necessary information, such that we know nibs are parts of pens (logically) and of nothing else. Consider too, *Bill's nose*. Nose's are logically 'part of' faces/bodies. We hear *Bill's nose* and we come to interpret that i) *Bill* refers to a human being or some animate (or representation thereof), ii) these entities have bodies/faces, and iii) these parts logically contain other parts; one of them being <u>a</u> nose. Note that *Bill's noses* is semantically odd, and that we would need some particular context in which to supply a coherent interpretation. No pragmatic priming is needed for us to come to an interpretation of *Bill's nose*.

What takes place here, (in this analysis) is that a type-shift on *nose* is necessary. Shifting from a sortal noun of type <e,t> to a relational type <e,<e,t>> is obtained so as to make room as it were for the extra argument slot (i.e. **part_of** a 'body/face'). The function/or partial word sense can be expressed as $\lambda y \exists x[\textbf{part\_of}(x,y)$, i.e. there is some x such that it is part of y. Once this is done the partial word meaning of *nose* listed in the Constitutive role may be included in the interpretation of the nominal complex.

Turning to sortal nouns such as *poem* and *book* (artefacts), we notice that when they are possessed by an animate they we are faced with two possible interpretations. But again both are restricted by the Qualia role entry for these nouns. Thus the lexical ambiguity of *John's book* can be resolved in two ways; i) by appealing to the Agentive role, or ii) the Telic role listed in the Qualia structure for the noun *book*.

Books 'come about' by being written by other people. Thus, the Agentive role entry $\lambda y\exists x[$**write'**$(y,x)]$ supplies the additional argument place needed in the interpretation of *John's book* where is 'the book that John wrote/is writing'. Books 'come about' by being written.

Alternatively, a further lexically driven interpretation of the phrase *John's book* is 'the book that John is reading'. This interpretation comes about by appealing to the Telic role specified in the lexicon under BOOK. The function or purpose of a book is to be read. It is postulated that all artefacts have some purpose or function as a direct consequence of Aristotle's modes of explanations (*aitiae*) (Pustejovsky 1995: 76). The necessary argument place is thus obtained from the partial word sense $\lambda y\exists x[$**read'**$(y,x)]$.

The last lexically determined relation described in the prenominal possessive concerns the notion of 'control'. The privileged reading of *X's Y* where *X* is animate is one of control, thus *Bill's pen*, *John's rock*, and *Mary's car* can be interpreted as some control relationship held between the possessor and the possessed noun. We do not characterise the relationship as one of ownership because the notion of ownership is a culture-specific concept[16]. Let it suffice to say that ownership is just one particular manifestation/understanding of the control relationship. We may have control of things that we do not own, but still we may refer to those objects as 'ours'. If the control relation were pragmatically determined then we would need some form of pragmatic priming, perhaps a previous mention of the control relationship that is referred to, before one could use such expressions as *Mary's car*. However there does not seem to be this constraint. 'Control-type' possessives may be felicitously used as first-mentions for the objects that they refer to.

A final point to be commented on here is the interpretations one obtains when certain relational adjectives precede the possessed nominal. Compare *Bill's book* with *Bill's favourite book*. It seems that *favourite* modifies the Telic role so that the expression *Bill's favourite book* is no longer lexically ambiguous in the same way as *Bill's book* is. (This proposal is also found in Vikner & Jensen (1999). The interpretation that obtains from *Bill's favourite book* is 'the book that Bill thinks was the most enjoyable to read'. Even if we prime the expression by inserting the name of some famous writer, we still get as a first reading the Telic role interpretation, thus we interpret *Stephen King's favourite book* as not a book that he wrote himself, but again a book that he enjoyed the most whilst reading it.[17] Consider the following exchange:

16) Journalist: *So, Mr King, what is your favourite book?*
    Stephen King: *Well, it has to be* <u>The tale of two cities</u>
    Journalist: ??*But you didn't write that!*

It seems from above that the default interpretation of *your favourite book* is 'one that you have read'. But even if we imagine that this is not what the journalist meant in the first line if the exchange, but rather 'which one of the books that you have written is your favourite' this still does not explain the oddness of the last line in this exchange. It is our contention that the last line is odd because the lexical interpretation of *your favourite book* is one that compares books as things that are read, not written. We then see that if we are to compare books in terms of the enjoyment of writing them then this has to be indicated pragmatically or by the

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[16] And as such would detract from the universal applicability of the concept. Some societies do not have the concept of 'ownership'. Consider the Marxist dictum 'Private property is theft'.

[17] Of course the expression *Stephen King's favourite book* could refer to a book that SK has written, but it is probably the interaction of world-knowledge that serves a special pragmatic priming for that interpretation. It is not necessarily a lexical interpretation. Consider these two sentences: i) *This is my favourite book but I did not write it*, ii) ??*This is my favourite book, but I have not read it*.

context. Thus the above dialogue improves radically if it is explicitly indicated that it is the writing of books that is under discussion:

17) Journalist: *So, Mr King, of all the books that you have written, what is your favourite book?*
Stephen King: *Well, it has to be* <u>The tale of two cities</u>
Journalist: *But you didn't write that!*

Vikner & Jensen have a very apt example in their own discussion (1999:27) of this adjective which bears repeating here:

18) A: *What is your favourite cigarette?*
B: *I don't smoke.*

It seems that *favourite* picks out the Telic role of the possessed noun and compares the object referred to by it with other objects which may be denoted by the same noun in terms of their Telic role. Thus, in some sense the possessive construction which includes a relational adjective such as *favourite* and *best* for example are implicitly comparative.[18]

A good test to this hypothesis is to take a noun which has no Telic role specified in its Qualia structure. It is predicted by Jensen & Vikner (1999) that we will not come to a lexically determined interpretation, and if a interpretation is obtained then it will be pragmatically driven. Let us look at some examples. Consider the phrases *Mary's favourite rock* and *Jane's favourite gold*. The nouns *rock* and *gold* are not associated with any purpose of function in their Telic role specification, and thus we do not come to immediate lexical interpretation of the phrases, unless we specify that *rock* and *gold* do serve a particular function for Mary and Jane respectively. As a consequence of this, when we try to interpret *Mary's favourite rock* and *Jane's favourite gold* we come to believe that, for Mary and Jane, these objects do serve some *purpose* for these two individuals; for example Mary might be a collector of rocks (so rocks function as objects of interest for Mary), and Jane might be a artist who designs and manufactures jewellery (and so gold functions as a material with which she creates beautiful things).

Not only may nouns denoting inanimate objects have a Telic role specified in the Qualia structure but even nouns denoting certain jobs that people perform may have a Telic role which may be compared using the adjective *favourite* (Jensen & Vikner 1999). Consider *my favourite teacher* and *my favourite plumber*, both are interpreted as referring to another person who I prefer to be taught by and have my plumbing jobs done by respectively. These job designations are of jobs that perform some service (i.e. function) *vis à vis* other people. The service that is performed may then be compared with services of the same type. Thus if we say that *X is my favourite teacher* it entails that we have been taught by at least one other person before and we am now comparing these individuals in terms of their performance of their Telic role. Again we see that *favourite* picks out only the Telic role specified for that noun, nothing more and nothing less. This is demonstrated by the following sentence:

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[18] The notion of comparison may be expressed by many different forms/constructions in one and the same language, and of course those particular forms may be employed in expressing other meanings too. On exploiting the differences between the semasiological and the onomasiological perspectives as a method of serious linguistic investigation see Andersen (1991, 1994).

19) *He is my favourite plumber, but I don't like him as a person*[19]

There are other nouns that denote jobs that do not supply a Telic role that can be compared by the adjective *favourite*, for example what *my favourite lumberjack* might refer to needs to be pragmatically determined since lumberjacks perform no service for others (unless one is a forest owner).

The adjective *best* on the other hand functions in a different way in possessive constructions. It seems that *best* takes a relational noun (or one that has been coerced to be a relational noun) and can bind with the Agentive role specified in the Qualia structure. Thus, we interpret *Mary's best poem* and *Jane's best picture* as superlative exemplars of a poem and a picture *produced by* Mary and Jane respectively.

The final adjective we will briefly comment on is *former* in the examples *Mary's former mansion* and *Mary's former favourite teacher* (examples from Partee (2000a: 6) and (2000b)). It is of particular interest in the light of the type-shifting operations we have seen (motivated by a consistency in analysis and supported by the partial word senses specified in *GLT*) whether we can account for ambiguous expressions and also be able to resolve these ambiguities in a principled manner. *Mary's former mansion* can refer to something that is no longer a mansion (perhaps it is a ruin), or it can refer (or more rightly put) it can be used to refer to a still existing mansion that is no longer in Mary's control.

Mary's former favourite teacher on the other hand, refers to someone who was Mary's favourite teacher, but no longer is her favourite teacher. This entails that this person was Mary's teacher at some time in the past. However, this does not entail that the teacher in question is no longer Mary's teacher, nor does it entail that this person is no longer a teacher either.

6. Summary

It seems that in some of the possessed noun phrases that we have looked at in the light of the proposals made in Jensen & Vikner (1994) and Vikner & Jensen (1999) we can account for the interpretations that we obtain in a principled manner. We appeal to partial word senses, type-shifting and strict compositionality (as shown in the categorial grammar tree structure above, where semantic types and syntactic structures were built up in a one-to-one stepwise relationship). But in the more complex expressions like *Mary's former favourite teacher*, there is an added complication in that the entailment patterns we see in other examples with certain adjective + noun combinations are not reproduced. This is an area of particular interest since it seems amenable to *GLT* and the notion of partial word senses. Partial word senses are not definitions of a word (since definitions should be mutually entailing with that which they define, i.e. 'iff definitions'), but rather they include 'one-way' entailments. It is in this manner that we could approach a better understanding of how complex expressions like *Mary's former favourite teacher* are interpreted, but still work in a compositional framework.

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[19] There could be confusion about the point we want to make here if we used the noun *teacher* in this sentences. This is probably because one's personality and one's ability to teach often are related in some way.

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