The redundancy of lexical categories

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Abstract

In this paper I argue that the familiar lexical category labels, N, V, A, P or equivalently the features such as $[\pm N, \pm V]$ are redundant in a theory which admits a level of argument structure. I modify Zwart’s (1992) conception of a-structure by arguing that major class members always include a ‘referential role’: <R> for nouns, <E> (for ‘eventuality’) for verbs and <A> (‘attribute’) for adjectives. <A> is coindexed with the <R> role of the modificand. A-structures are canonically associated with sets of F(unctional) features, but ‘mixed’ a-structure types may be associated with ‘mixed’ F-features, without the need to postulate ‘mixed’ lexical categories. Categorial information can thus be read off a-structure representations without the need for purely syntactic category features.

I first develop a (constructional) semantics for compound nouns (N N) in which the a-structure of the modifying noun receives a new r(eferential) role <A> with demotion of the original <R> role. The new <A> role is coindexed with the <R> role of the modificand and the attributive relationship interpreted as some pragmatically characterized relationship, $\rho$. Relational adjectives are given a similar argument structure representation with the same semantic interpretation, but in their lexical representation. I sketch an analysis of participles in which the <E> role of the verb is demoted by introduction of an <A> role. Deverbal nominals are obtained by demoting the <E> role and adding an <R> role (essentially naming an event). By assuming that a-structure is articulated we can account for the typologically observed patterns of argument realization in nominalizations.

1. Introduction

Syntactic theory has been progressively ridding itself of redundancies, and a good deal of attention has been devoted to deriving morphosyntactic properties from other, more primary (motivated) properties of the semantic representation. Thus, it is widely recognised that argument structure representations and alternations are primarily the result of semantic conditions on well-formedness (where this may include notions of event structure or aspectuality). Nonetheless, many theorists still argue for a morphosyntactic level at which the basic adicity of a predicate is represented. Examples of such models include those in which there is an overt level of predicate-argument structure (PAS or a-structure) as in Williams (1981) Grimshaw (1990) or Levin and Rappaport Hovav (1995) or a covert one as in Jackendoff’s (1990) A-annotations for LCS participants. A related model is that of Hale and Keyser’s (1993) level of LRS in which the syntactic category labels are used to denote conceptual categories corresponding to entities, properties, relations and events. A level with essentially the same functions as a-structure is postulated in a

By far the most attention has been devoted to verb argument structure and one of the main functions of the PAS representation is to distinguish those verb alternations which do not involve any (idiomatic) change in meaning from those that do. The meaning-preserving alternations are then regarded as operations over argument structure, while the meaning-changing alternations are treated as operations over the underlying semantic structure, or LCS (cf Sadler and Spencer, 1998). However, there may be disagreement as to what constitutes a meaning-preserving or changing alternation (cf the different attitudes towards the English middle construction in Sadler and Spencer, 1998, and Levin and Rappaport Hovav, 1998). However, one of the clear lessons to be learnt from recent studies of verb valency is that the PAS can be projected almost entirely from LCS, hence, is almost entirely redundant as classificatory device. Given that a good many groupings and alternations can be shown to be sensitive to subtle aspects of meaning (if not all, cf. Pinker 1989, Van Valin 1990), the question arises as to whether the level of PAS might not be entirely redundant.

One important, and possibly irreplaceable, role has been proposed, however, for PAS representations. In the theory of theta-discharge advanced by Higginbotham (1985), it is positions in a-structure which are bound, identified with or marked by thematic elements such as verbs and adjectives. Higginbotham’s (1985) reworking of Davidson’s (1967) views on event structure proposes that the PAS of a verb includes a position corresponding to the notion of ‘event’ and that this position is accessible to modification by adverbials and the tense operator. Williams’ (1981) original model included a ‘referential’ role for nouns, which is coindexed with the thematic (semantic) roles of verbs when the verb discharges its semantic role onto a complement or subject. Finally, it is generally assumed that adjectives represent one- or two-place predicates which have semantic roles akin to those of verbs. An adjective is thus a little like a verb, but without the event role.

These assumptions are summarized in the amalgam shown in (1), which I shall treat as a ‘traditional’ view on PAS:


  kick       <E, Ag, Th>
  tree       <R>
  tall       <Th>
  afraid(-of) <Exp, Th>

Ignoring prepositions for the present, we can immediately detect considerable redundancy between PAS representations and lexical syntactic category membership: <E> = Verb, <R> = Noun, <Bare Theta role(s)> = Adjective. Note that this is more than a rehearsal of the older ‘notional’ parts of speech tradition in which we would simply say that words denoting events are verbs, those denoting things are nouns and those denoting properties are adjectives (cf Lyons 1968 for detailed discussion; for more recent discussion of the relation between notional categories and syntactic categories see Anderson, 1997, Croft, 1991, Dixon, 1991). To be sure, in the standard cases we can read syntactic category directly off the semantics. However, with an
intermediate level of argument structure as in (2) we open up the possibility that syntactic category membership might become redundant even in more complex cases such as deverbal nominalizations, or in denominal adjectives. That is all the more so in theories which make use of some principle such as the Theta Criterion of GB theory (Chomsky 1981) or the Function-Argument Biuniqueness constraint of LFG (Bresnan 1996), in which insertion into the syntax of a lexical item of the wrong category would cause the derivation to crash simply because of failure of selection.

The thesis to be defended here is that, given a level of a-structure, lexical syntactic category features are entirely superfluous. In general, the job of categorizing words into parts of speech classes can be done by a mixture of purely semantic constraints and constraints appealing to PAS representations. In turn, these PAS representations are independently needed for purposes of theta discharge, and, arguably, to capture meaning-preserving alternations. We might also wish to identify Croft’s (1996) notion of Primary Information Bearing Unit with that of ‘element bearing a PAS’. At the same time, many of the properties which are often attributed to major category features are better thought of as properties of the functional categories or functional features (f-features) which accompany major parts of speech, such as determination, tense, agreement features of various sorts, and so on. These are assigned to lexical items on the basis of their a-structures by universal principles modulated by language particular rules.

Many linguists find it convenient to distinguish between inflection and derivational processes. Inflection creates word forms of a single lexeme, while derivation creates new lexemes. However, the distinction is notoriously hard to establish. One rather serious problem is the existence of inflectional morphology which changes syntactic category. Such processes are extremely common, though they tend to be ignored. A prime example is the verbal participle, which in many languages clearly behaves like part of the verb paradigm (and shows, for instance, tense and/or aspect distinctions as well as retaining the argument structure of the verb), while on the other hand it inflects like an adjective. Likewise, gerunds and infinitives in many languages inflect rather like nouns (in taking case endings, for instance). Deverbal nominalizations (‘action nominals’ often referred to as ‘masdars’ in Arabic linguistics and traditions influenced by it) pose another well-known problem. Cases of this sort have been discussed recently in some detail by Haspelmath (1996). Less obviously problematical, but no less troublesome in some languages are noun-to-adjective transpositions, or relational adjectives. These transpositions are summarized in (2):

\[
\begin{align*}
  N & \rightarrow \text{Adj} & \text{relational adjectives} \\
  V & \rightarrow \text{Adj} & \text{participles} \\
  V & \rightarrow \text{Adv? N?} & \text{gerunds} \\
  V, A & \rightarrow \text{N} & \text{nominalizations (incl. infinitives)}
\end{align*}
\]

I shall argue here that these problems largely evaporate if we accept the conclusions of the earlier paragraphs, namely that there are no lexical syntactic categories. Then we can treat the category-changing inflection as simply another species of PAS alternation. A deverbal action nominal will be a verb whose event role, ‘E’, has been ‘demoted’ and supplanted by a nominal ‘R’ role, indicating that its denotation is the name of an event, rather than the event itself.
In this paper I shall concentrate primarily on attributive modifiers and explore the relationship between N + N compounding in English and relational adjectives. I begin with a survey of Zwart’s (1992) exploration of the homologies between syntactic structures and semantic structures (Section 2). Then I present the analysis of relational adjectives. Section 4 sketches an account of participles and nominalizations and Section 5 presents summary conclusions.

2. Zwart’s model

Zwart proposes a theory of lexical categories in which there is considerable redundancy between semantic and syntactic representation. He assumes a standard type-theoretic semantics, enriched to some extent under the influence of Jackendoff (1990) and other work in that tradition. He also assumes a level of argument structure, essentially a modified neo-Davidsonian semantic representation in which the argument structure representation is a conjunction of predicates referring to semantic roles of various kinds. The central innovation in Zwart’s analysis is the idea that the argument structure is headed. He proposes that the four major categories of N V A P have a referential argument position, as shown in (3):

(3) Noun <R> R = referent
Verb <E: Ag(x), Th(y), ...> E = event
Adjective <G: Th(x)> G= degree
Preposition <S: Th(x), Ground(y)> S = space

I shall refer to this as the r-argument (position) or r-role.

The referential argument of the noun is usually the sole argument, and corresponds to Williams’ (1981) ‘R’ theta role. The ‘E’ position of the verb is Higginbotham’s event role. The referential role of an adjective is denoted by ‘G’ (for ‘gradable’) and stands for a degree. The idea is that a canonical adjective phrase specifies the degree to which a property or attribute holds of an entity (here expressed as the Theme of that adjective). Finally, the prepositional referential role is that of ‘space’. This corresponds to a path, endpoint or space. In metaphoric extension, the ‘space’ argument can denote times. Zwart argues that a typical preposition, such as behind (the house), denotes a relation between an external argument or Theme, whatever it is that is behind the house, and a Ground, the house, with reference to which the location of the Theme is stated.

The r-roles help distinguish the logical sort of a predicate and in this sense are entirely different in function from the theta roles. Thus, while an adjective, intransitive verb, intransitive preposition and common noun might all be analysed as one-place predicates of the type <e, t> they can be distinguished by their r-arguments. The other purpose of the r-arguments is to serve as the locus of ‘theta discharge’ (cf. Higginbotham 1985). It is the r-argument position which is bound by determiners, tense operators, degree modifiers and so on. It is also the position which is coindexed with argument positions of predicates. Thus, in the man sleeps or hit the man, a theta role in the argument structure array of the verb sleep or hit is coindexed with the <R> role of (the) man. Finally, it is the r-arguments which are coindexed by theta identification in modification. Thus, in the tall man, the <G> position of tall and the R position of man are coindexed to indicate the fact that tall modifies man.
Thus far we have a precise correspondence between argument structure sortal categories and syntactic lexical categories. The obvious step would then be to say that this renders the syntactic categories redundant. However, Zwart does not take this step. First, he points out that it is possible to have nominals which share a thematic array with verbs, as when we derived an action nominalization from the verb. In that case, we could simply replace the <E> position with the <R> position. However, this would mean that <R> would end up being “...of a very general ontological category” so he suggests (p. 60) that it is better to allow nouns to be associated with all four sortal categories. This means that some way has to be found of distinguishing verbs from their action nominals, and syntactic category is the only way left (apparently).

There is another important reason in Zwart’s system for retaining syntactic category features. Zwart draws attention to the distinction between the subclasses shown in (4):

(4) common noun <R> proper noun <>
eventive verb <E: ...> stative verb <...>
gradable adjective <G: Th> non-gradable adjective <Th>

He argues that proper nouns, stative verbs and non-gradable adjectives differ from their canonical counterparts in lacking any r-role. Given this, the only thing which will distinguish, say, an intransitive stative verb such as *live (as in Jesus lives) from a non-gradable monadic adjective such as alive will be the syntactic category features. There doesn’t seem to be a non-referential equivalent to a preposition. I will briefly consider in turn each of the three categories for which this proposal is made.

The lack of referential role with proper nouns is essentially motivated by the failure of proper nouns to take determiners. Zwart argues that when used as ‘proper’ proper nouns, there is no genuine determination and no modification. Thus, expressions like *the/every/this/tall John are ungrammatical (though non-restrictive modification is possible, witness the unfortunate John). By use of type shifting Zwart argues that it is possible to treat generic common nouns, too, as lacking the <R> role. Whether the impossibility of modification is really a consequence of argument structure or a consequence of some other, purely semantic, property is not clear. Arguably, Zwart is talking about semantic incompatibilities rather than types of argument structure. Thus, even if we were to give a proper name an <R> referential argument, we would hardly get a coherent semantic representation from a determined, quantified or restrictively modified noun of this type. But if this is the case, to what extent are we talking about syntax in the first place? It is interesting that some proper nouns obligatorily cooccur with the definite article, such as The Hague. Zwart argues that such nouns undergo an obligatory type shifting (of the kind that yields expressions such as the young Einstein with other proper nouns). Now, for some languages which Zwart doesn’t mention, such type shifting would have to be fairly extensive. Thus, in many languages proper names denoting people obligatorily take the definite article. Zwart also points out that proper nouns cannot undergo restrictive modification because they denote singletons (or singleton sets if type shifted) and restrictive modification of such an entity is nonsensical. But this again is a semantic restriction and which must be imposed independently of argument structure.

Zwart’s proposal to relieve proper nouns of their r-argument leaves the problem of exactly how theta-marking is to take place when a proper noun is the
argument of a predicate. There can clearly be no coindexation between the verb’s argument structure and that of John in hit John, if the referential argument is missing. Zwart is silent on this question, and no doubt the formalism he operates with is sufficiently powerful to permit some sort of mechanical solution to the problem, but this would leave us with an unwelcome disjunction in the treatment of the complements and subjects of predicates (cf. also my remarks below about tense assignment to Stative verbs).

Turning now to verbs, Zwart follows a number of authors in arguing that verbs of perceptual report relate a percipient with an event. Such verbs cannot take a stative verb as a complement. Zwart argues that this is because statives lack the <E> role, and that it is this role which is accessed by verbs of perceptual report. Now, in Higginbotham’s original account, the <E> role is bound by the Tense operator. Zwart suggests that for stative verbs the tense predicate takes the VP as its value, rather than the <E> role. There is no other motivation for this disjunction. On Zwart’s analysis stative verbs will have a-structures indistinct from those of (non-gradable) adjectives. Suppose that for at least one verb/adjective pair there is no other semantic difference that might govern the syntactic behaviour of the word, but that nonetheless the two words belong to distinct syntactic classes, for instance, suppose only one of them can take tense inflections. In a theory which retains lexical category features this can be handled by allowing only projections of V to fall in the scope of Tense. But note that this is a stipulation. It does not follow in any obvious way from the definition of lexical categories or of the Tense operator. Thus, there is still no principled explanation of why it is that verbs are marked for tense but not adjectives.

However, to what extent do we have to say that stative verbs lack any kind of referential role? Suppose we interpret <E> as ‘Eventuality’ (e.g. in the sense of Bach 1986) rather than ‘(dynamic) event’, covering all the types of situation that verbs might denote (as in the original proposal of Higginbotham 1985). We can then subcategorize the E-for-Eventuality role into (at least) an eventive Ev role and a stative St role (and, perhaps, other members of the Vendlerian taxonomy). Verbs of perceptual report will now select only verbs with the genuinely eventive Ev role. The tense operator can now be defined in such a way that it will bind only the Eventuality role. As far as I can tell from Zwart’s brief account, there are no other consequences of depriving statives of a referential role\(^1\). Thus, we will still retain an a-structure representation which is capable of distinguishing verbs from other parts of speech, and, moreover, it does this in a principled fashion.

For adjectives, Zwart argues for a distinction between those that are gradable, such as tall, red, pretty and those that are not. The latter include simple binary adjectives such as dead or married but also denominal relational adjectives such as adjectival, atomic. Zwart, however, draws a finer distinction between measure adjectives such as tall, old, rich and non-measure adjectives such as pretty, healthy, lazy. The measure adjectives can take some kind of measure phrase (two meters tall) while the non-measure adjectives, while gradable (very pretty), don’t denote properties which can be expressed as sets of degrees along a scale. The measure adjectives have in their argument structure a ‘G’ referential role which is bound by degree expressions. All other adjectives denote simple properties and lack the

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\(^1\) Interestingly, Kratzer (1996) now regards stative verbs as possessing an <E> role, though this follows from assumptions about external arguments which I don’t necessarily share.
referential role in their a-structure. In order to express the fact that non-measuregradable adjectives like *pretty* can still receive degree modification (*very pretty*) Zwart again assumes type shifting. The type of simple properties will be \( e_p \), corresponding to an a-structure with just a Theme role, \(<\text{Th}(x)>\), while the type of measure adjectives such as *tall* is \(<e_D, t>\), where \( e_D \) is the type of degrees, with a-structure \(<G: \text{Th}(x)>\). Thus, by shifting from *pretty* \(<e_p>\) to *pretty* \(<e_D, t>\) we obtain an a-structure \(<G: \text{Th}(x)>\) for *pretty* and this maps a property to the set of degrees that realize that property.

What remains unclear from this account is why non-measure adjectives such as *pretty* fail to take measure phrases when they undergo type shifting. The representation for *tall* will be something like (5):

\[
\exists d \left[ \text{tall}'(x, d) \& d > d_A \right]
\]

where \( d_A \) refers to some ‘average’ or ‘standard’ degree of tallness (p. 138 ex. (2c)). But this means that the difference between *tall* and *pretty* is essentially in the LCS representation, not in the a-structure, since both *tall* and *pretty* can be given an a-structure of the form \(<G: \text{Th}(x)>\). Again, the facts of determination tell us about semantic incompatibility rather than a morphosyntactic failure of theta discharge. In fact, it is not necessarily a semantic fact about *pretty* that it is a non-measure adjective, witness (6) (I leave it to social psychologist to operationalize the quantification and measurement of prettiness):

(6) Anna is twice as pretty as Bella

If these arguments are accepted then the distinction between the two types of gradable adjective becomes encyclopaedic and not even semantic (i.e. not something to be represented as such at the level of LCS).

One of the differences between measure and non-measure adjectives is supposed to be that non-measure adjectives permit the entailment (7):

\[
x \text{ is more adj than } y \Rightarrow x \text{ is adj}
\]

Thus, if Anna is prettier than Bella, then Anna has to be pretty in some absolute sense. This is not true, however, of Anna is taller than Bella, since both could be very short. But this is a fact about syncategorematicity which is independent of measurability. For instance, not all syncategorematic adjectives like *tall* are necessarily measurable. Thus, *good* is the classic example of a syncategorematic adjective but it is impossible (even in formal moral philosophy) to measure goodness. Likewise, there are measure adjectives which are not syncategorematic and in which entailment (7) therefore holds, as in (8)²:

²Note that it is not just adjectives which can be gradable. Lexicalized PPs may have this property too:

(i) Tom’s reaction was completely over the top
   A completely over-the-top reaction

Presumably, the phrasal idiom will have to be given the a-structure of an adjective here, though some idioms at least may retain some of their original syntactic structure:

(ii) She’s in ecstasy over her new car
    She’s in complete/total/utter ecstasy over her new car
Your account is five pounds overdrawn \( \Rightarrow \)
Your account is overdrawn

The conclusion I draw from this is that the question of gradability, like the question of determination of nouns, is an LCS phenomenon (or possibly a matter of encyclopaedic knowledge) and not an a-structure matter. This is not to cast doubt on Zwart’s specific analyses, which are very plausible when recast in purely semantic terms. Rather, I deny the use of a-structure representations to capture these facts.

We now turn to the nature of modification. Zwart offers a fairly uncontroversial interpretation in (9) (p. 63):

(9) “A lexical head L is modified by a phrase XP iff:
   a. L governs XP, and
   b. the prominent argument of XP is coindexed with the referential argument of L.”

The important part of this definition is (9b). The term ‘prominent argument’ refers to the first thematic argument in the theta array. For an intransitive adjective or preposition this will be the sole Theme argument, and for a transitive adjective or preposition, this will also normally be the Theme argument. Example with intransitive adjectives is (10, 11):

(10) a. tall woman
    b. tall\(<G: Th_i>\) woman\(<R_i>\)
    c. \(\lambda x[\text{tall}'<G: Th(x)> \& \text{woman}'(x)]\)

(11) a. pretty/married woman
    b. pretty/married\(<\text{Th}_i>\) woman\(<\text{R}_i>\)
    c. \(\lambda x[\text{pretty}'/\text{married}'(x) \& \text{woman}'(x)]\)

Note that Zwart’s ‘G’ argument plays no role whatever in theta discharge here.

Where a noun lacks a referential argument (because it is a proper noun) there can be no modification, but this is only true of restrictive modification. Proper nouns can easily be modified non-restrictively: The unfortunate Mr. Smith... (Note the definite determiner.) Zwart handles such cases by type shifting, but this is unnecessary if proper nouns retain their <R> role. Thus, restrictive and non-restrictive modification can remain indistinguishable in terms of a-structure. In sum, proper nouns (and generics) have a referential argument, though the LCS with which this is associated has properties which prevent certain kinds of determination, quantification and modification.

3. A revised theory of argument structure for adjectivals

In this section I shall begin with a consideration of the way in which a noun modifies another noun in a root compound and compare this with the modification of a noun by a relational adjective. This will motivate the <A> r-role for adjectives.

I leave this question aside, since it is unclear exactly what the facts are. Relevant discussion of the role of idioms can be found in Jackendoff (1997).
3.1 Compounds and relational adjectives

What is the relationship between the head (bomb) and non-head (atom) of an endocentric compound such as atom bomb the ensures that atom is taken as a modifier of bomb? The simplest response would be to say that the two referential roles are coindexed and that this constitutes the modification relation, as in (13):

(13) a. atom bomb
    b. atom<\text{R}_1> bomb<\text{R}_1>
    c. \lambda x[\text{atom}'(x) \& \text{bomb}'(x)]

However, the natural interpretation of such a representation would have us assert of an atom bomb that it was at once an atom and a bomb. This is fine for the double-headed, so-called appositional compounds such as Austria-Hungary, but hopeless for the true endocentric compounds.

It seems to be widely accepted that such compounds are interpreted pragmatically. As Downing (1977) showed, speakers coin such compounds readily on the basis simply of encyclopaedic knowledge and pragmatic prominence. However, various authors have tried to argue for a way of determining semantically the relation between such compounds. In a detailed analysis of a broad range of data, Levi (1978) concludes that we need no more than a set of nine semantic primitives capturing all the relationships between head and modifier in noun-noun compounds. Interestingly, her primitives are very similar to those found in decompositional approaches to lexical semantics, such as Jackendoff (1990). The primitives are sufficiently general, and are interpreted with such elasticity, that it is sometimes hard to know what would count as a counterexample. Nonetheless, Levi does provide a number of counterexamples to her own analysis, including a number of systematic types. My overall impression is that Levi has isolated the commonest classes of interpretation which would be expected given the way language users conceptualize the world, but has not succeeded in establishing any genuinely linguistic constraints on interpretation.

In Spencer (1995) I suggested that the simplest way to account for such meanings was to assume that the compound construction itself is associated with a predicate \( \rho \), which asserts some pragmatically defined relationship between the denotata of the two nouns. This is illustrated in (14):

(14) \( \lambda \rho \lambda x[[\text{bomb}'(x)] \& \rho(\lambda w[w=x], \lambda y[\text{atom}'(y)])] \)

In other words, an atom bomb is a bomb such that there is some relationship between the property of being an atom and the property of being that bomb. What this means is that the semantic interpretation of a sentence containing a compound will provide the modifier with the representation shown in (15):

(15) \( \lambda P \lambda z[P(z) \& \rho(\lambda w[w=z], \lambda y[\text{atom}'(y)])] \)

The constructional meaning of a compound noun is given explicitly in (16):

(16) \( N_1<\text{R}_1> \) in the construction \([N_1<\text{R}_1>, N_2<\text{R}_2>] \) corresponds to \( \lambda P \lambda z[P(z) \& \rho(\lambda w[w=z], \lambda y[\text{noun}'(y)])] \)

where \text{noun}' is the denotation of \( N_1 \)
This means that the representation for *atom bomb* will be (17), which after $\lambda$-conversion collapses to (14):

(17) $\lambda P \rho \lambda z [P(z) & P(\lambda w[w=z], \lambda y [atom'(y)])](\lambda x [bomb'(x)])$

If proper nouns also have $<R>$ referential role, this works equally for them:

(18) a. London fog
b. London$fog<R_i>$
c. $\lambda P \rho \lambda z [P(z) & P(\lambda w[w=z], \lambda y [london'(y)])](\lambda x [fog'(x)])$

The representation yielded by (16) is read off syntactic structure. We do not create a separate ‘adjectival’ lexeme every time we use a noun as modifier in a compound. Indeed, both the LCS and the PAS of the noun remain unaltered.

### 3.2 Attributive adjectives

The $r$-role Zwart attributes to adjectives thus seems to be more a property of semantics than of a-structure. On the other hand, Zwart fails to relate the a-structure of adjectives to their principal function, that of attributive modification. Let us pursue the spirit of Higginbotham’s (1985) original insights by assuming that the $r$-role of all adjectives is a role which relates not to the cognitive content of the predicate (as is the case with the $<R>$ and $<E>$ roles) but to the semantic function of adjectives, namely attribution. I will accomplish this by coindexing $<A>$ with the prominent thematic argument of the adjective. When modification occurs in the syntax the $<A>$ role is linked by a different coindexation with that of the $<R>$ role of the modificand by theta identification. Hence, by virtue of the transitivity of these two distinct linkings, a coindexation is indirectly established between the prominent argument of the adjective and the referent of the noun. Typical PAS representations are shown in (19):

(19) tall$<A_i: Th(x_i)>$ afraid$<A_i: Exp(x_i), Th(x)>$

In the syntax we will obtain the representations shown in (20):

(20) a.

```
NP
  AP
    A
      tall
    N
      woman
```

b. $\lambda x [tall'(x) & woman'(x)]$

We must guarantee that the structure in (20a) corresponds to (20b), so we assume the default interpretation given in (21):

(21) adj$<A_i: x_i>$ translates as $\lambda Q \lambda x [adj'(x) & Q(x)]$
When applied to a noun such as *woman* with translation $\lambda z[\text{woman}'(z)]$ an adjective such as *tall* will give (22):

$$
\lambda Qx[tall'(x) & Q(x)](\lambda z[\text{woman}'(z)])
\Rightarrow
\lambda x[tall'(x) & \lambda z[\text{woman}'(z)](x)]
\Rightarrow
\lambda x[tall'(x) & \text{woman}'(x)]
$$

The account so far handles ‘ordinary’ qualitative adjectives such as *tall*, *pretty*, as well as non-gradable adjectives such as *married*. It will also handle derived adjectives such as *milky*, *girlish*, *cat-like*, *readable*, and so on. The relationship between, say, *cat-like* and *cat* is a matter of LCS and not PAS. Is this also true of relational adjectives such as *atomic*? So we wish to say that the relationship between the relational adjective *atomic* and the noun *atom* results from an operation over the LCS representation of the noun? We might, for instance, want to say that *atomic* has some predicate, say, REL in its LCS meaning ‘related to’, giving [REL[ATOM]] just as *milky* means (very roughly) [LIKE[ MILK]]. However, an elements such as REL itself wouldn’t really contribute anything to the LCS of the adjective. To call something an *atomic bomb* is to claim some relationship between the property of being that bomb and the property of being an atom, rather than attributing ‘atomicity’ to *bomb*. But this is exactly the pragmatically determined relation $\rho$ used to define the constructional meaning of compounds. Hence, the relational adjective should be derived directly from the noun at the level of a-structure, in such a way that the noun acquires an attributive referential role which then coindexes with the base noun’s referential role, as shown in (23):

$$
\text{atomic: atom<A i: R_i>}
$$

This can now be interpreted in the same way as the modifier in a compound noun, as in (24):

$$
\text{noun<A i: R_i> translates as }
\lambda P\lambda \rho \lambda z [P(z) & \rho(\lambda w[w=z], \lambda y[\text{atom}'(y)])]
$$

In other words, the interpretation of relational adjectives is the lexical equivalent of the pragmatically defined relation in compounds. The meaning of *atomic bomb* is now derived as in (27), essentially as for *atom bomb*:

$$
\begin{align*}
\text{a. atom<A i: R_i> bomb<R_i> } & \Rightarrow \\
\text{b. } & \lambda P\lambda \rho \lambda z [P(z) & \rho(\lambda w[w=z], \lambda y[\text{atom}'(y)])]\lambda x[\text{bomb}'(x)] \\
\text{c. } & \lambda \rho \lambda z[\text{bomb}'(z) & \rho(\lambda w[w=z], \lambda y[\text{atom}'(y)])]
\end{align*}
$$

Note that the basic interpretation of *atomic* is identical to that of the noun from which it derives. For this reason, the formulae in (27b,c) make reference to the property $\lambda y[\text{atom}'(y)]$ and not the property $\lambda y[\text{atomic}'(y)]$. The adjectival morphology is nothing more than a reflection of the changed a-structure of the noun, and not the bearer of a semantic constant, such as the -like of *cat-like* or the -y of *milky*. In this sense, then, the derivation of a relational adjective creates a distinct form of a nominal lexeme rather than creating a distinct adjectival lexeme. Beard (1995: 189) argues that there are no grounds for treating relational adjective formation as derivational morphology proper, because there is no conceivable relationship between the various meanings expressed (e.g. from Levi’s list) and the affixation used for it. For him, this
means that the process of forming the adjective must involve nothing more than a
switch of category features. His argument is sound in structure: if relational adjective
formation is not a form of lexical derivation, then there must be some level other than
LCS at which it occurs. My argument is that that level is a-structure.

Purely relational adjectives are not as common in English as in many
languages. There is a strong tendency for such adjectives to drift and acquire the
meanings of quality adjectives. Thus, although syntactic ought to be a pure relational
adjective from syntax, it is possible to apply degree modifiers to it (as in Your
analysis of nominalizations is very syntactic/too syntactic for my taste/more syntactic
than John’s). This sort of usage is impossible or at least much more restricted in a
language like Russian which lacks simple compounding and therefore has to use
relational adjectives in the original form. This semantic drift with English relational
adjectives is not difficult to understand given that there is an equivalent constructional
meaning. Presumably what happens historically is that the interpretative formula in
(26) gets lexicalized so that the ρ relation is given a concrete semantic interpretation.
This means that the relationship has to be recorded in the LCS and we have then
created a new lexeme.

There remains a final question: how do we account for the fact that modifying
nouns in compounds can, under certain circumstances at least, be modified by
adjectives, just as though they were ordinary nouns (e.g. red brick house, American
history teacher = teacher of American history)? First, we form the phrase red brick.
This is headed by a noun, though one which is modified by an adjective: red<\text{A_i: Th(xi)}>(brick<\text{R_j}>). Then, the compound N interpretation rule converts the noun into
a relational adjective to give (28):

\[(28) \ [\text{red}<\text{A_i: Th(xi)}>>(\text{brick}<\text{R_j}>>)(\text{house}<\text{R_j}>)\]

This process is rare if the phrase is not listed (cf. *expensive brick house in the sense
house made from expensive bricks).

The present account of relational adjectives provides us with an unexpected
solution to an intriguing problem. In (29) we see an example of a morphosemantic
mismatch of a kind much discussed in the literature:

(29) East German capital

The problem is that East German is clearly an adjectival form (essentially a relational
adjective) derived from East Germany. But part of what East is supposed to modify is
lacking:

(30) a. [\text{NEast Germany}]

b. [\text{A[NEast German-∅]??}]

This is only a problem, however, if we persist in regarding the relational adjective as
a new lexeme formed by derivational process. If we consider German (at least in
(28b)) to be simply a form of the lexeme Germany then we can offer the analysis in
(29), corresponding to (30):

\[3\text{ I am grateful to Phil Lesourd for discussion of this point.}\]
The forms in small capitals in (29) are names of lexemes irrespective of their a-structures, while the word forms are given in lower case. The morphosemantic mismatch then disappears as an artefact of a wrong analysis (just as the past tense form *sang* doesn’t represent a morphosemantic mismatch simply because it has no past tense suffix).

4. **Alternations affecting the ‘E’ referential argument**

Transpositions from noun to adjective are accomplished by ‘demoting’ the <R> referential role of the noun and adding the <A> role of an attribute as the new referential argument. The new r-role will then trigger a host of adjectival features, such as agreement, largely or completely displacing the f-features of nouns (though there is much to be said about the way this happens in individual cases). In this section I briefly sketch a treatment of transpositions from verb to adjective (participles) and verb to noun (deverbal nominalization), in which it is the verb’s eventuality role, <E> which is demoted.4

4.1 **Participles**

Verbs cannot normally modify nouns attributively because they lack the attributive <A> role of adjectives. However, many languages, of course, permit the formation of participles, which are essentially verb forms functioning as attributive adjectives. Participles pose a serious problem for traditional conceptions of inflection and derivation because on the one hand they seem to belong to a verb lexeme, but on the other they inflect as adjectives, an apparent case of category-changing inflection (cf Haspelmath, 1996). The obvious way to handle participles in the present framework is to assume an operation which adds an attributive role to the a-structure of a verb, demoting the <E> role. The <A> role is coindexed with the most prominent of the verb’s (non-implicit) arguments, the external argument in an active participle and the internal argument of a passive participles (or the active participle of an unaccusative). Note that a language doesn’t have to have a syntactic passive voice in order to have a passive participle (e.g. Chukchee).

The participle retains the thematic roles of the verb, and its principal f-features will be those associated with adjectives, but may also retain some f-features licensed by the <E> role. For instance, Russian participles arguably reflect tense and aspect (perfective/imperfective) in addition to voice, as shown in (32) (though how exactly

---

4 Clearly, we can handle deadjectival nominalizations in the same way, by giving a nominal such as *redness* a representation *red*<R:A, Th(x)>. A number of interesting technical questions remain, which cannot be addressed here.
the semantics of finite f-features relates to that of non-finite features is somewhat controversial):

(32) Russian participles: *delat’/sdelat’* ‘make (impf/pf)’

<table>
<thead>
<tr>
<th>Active</th>
<th>Passive</th>
<th>Aspect</th>
</tr>
</thead>
<tbody>
<tr>
<td>past</td>
<td>non-past</td>
<td>past</td>
</tr>
<tr>
<td>dela-vš(-ij)</td>
<td>delaj-ušè(-ij)</td>
<td>delaj-em(-yj)</td>
</tr>
<tr>
<td>s-dela-vš(-ij)</td>
<td>s-dela-n(-n-yj)</td>
<td></td>
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<th>past</th>
<th>non-past</th>
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<tr>
<td>s-dela-n(-n-yj)</td>
<td></td>
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More generally, a non-finite verb form is a verb whose <E> role has been demoted by some other, and which therefore cannot license the full range of canonical verb f-features, but which nonetheless can express some of those verbal f-features (with much language particular variation).

Babby (1993) discusses the perfective passive participle, concluding that this is a verb form, though one which has adjectival inflectional features. Babby argues (1993:9) that since (only) true adjectives form comparatives and manner adverbials that they must be categorically distinct from participles, and that this difference should best be reflected in terms of "...a more finely grained decomposition of the lexical categories into categorial features...". But this conclusion does not necessarily follow: relational adjectives (which are abundant in Russian) have neither comparative forms nor manner adverbial derivates, but they behave morphosyntactically like adjectives rather than, say, as some sort of subcategory of noun. Thus, doubt over the categorial identity of participles remains.

A simple way of viewing these participles is to assume that the <E> role of the verb first licenses a set of Tense/Aspect f-features and is then ‘displaced’ by the <A> role, which subsequently licenses the principal f-features associated with the participle:

(33) Participle formation

**Active**

\[ \text{verb}<E: x, y, ...> \Rightarrow \text{verb}<(\text{Tns}(E), \text{Asp}(E): x, y, ...)> \Rightarrow \text{verb}<A(x): \text{Tns}(E), \text{Asp}(E), y, ...> \]

**Passive**

\[ \text{verb}<E: (x), y, ...> \Rightarrow \text{verb}<(\text{Tns}(E), \text{Asp}(E): (x), y, ...)> \Rightarrow \text{verb}<A(y): \text{Tns}(E), \text{Asp}(E): (x), y, ...> \]

There is a good deal more to say about participles, of course, but this simple illustration at shows how the system advocated here can treat these as a ‘mixed category’ without falling into contradiction. Note that we nowhere have to ask embarrassing questions about whether this is ‘genuine’ inflection or ‘genuine’ derivation: it is an operation over a-structure with determinate consequences for the expression of f-features.
4.2 Nominalizations

A particularly problematic case of category shift is the eventive deverbal nominalization, in which [N, V] features seem to switch values. At the same time the nominal retains the verb’s argument structure and continues to refer to an event. A full analysis of the nominalization will have to await a separate study, but the basic analysis is simple and obvious and is shown in (34):

(34) the shooting of the lion by the hunter

    shooting <R: E, x, y> (hunter <R_x>, lion <R_y>)

The thematic arguments, x, y, of the verb are coindexed with the <R> roles of the argument nominals by theta discharge, just as in the case of finite verbs. The <R> role displaces the verb’s <E> role and serves to name the event. It also ensures that (under certain circumstances) the verb’s arguments will be realized in the manner of arguments of a noun (i.e. as possessive prenominal modifiers or of-complements).

The difficulty with nominalizations comes when we ask what the morphosyntactic expression of the nominal is. There is an event position, though it no longer functions as the r-role. We have seen that in participles this position may still be specified by verbal functional features such as Tense and Aspect. This is rather less common with nominalizations. However, just as the <A> role of participles determines the syntactic behaviour of the participle (as canonical noun modifier) and the f-features it is associated with (adjectival ones), so the <R> role of the nominalization triggers nominal f-features such as [Definiteness] and [Case], and may also trigger case assignment to complements typical of nouns rather than verbs. Nominalizations which themselves are marked for case may function as gerunds (e.g. many Caucasian languages, Chukchee) or as case-marked ‘infinitival’ adjuncts and complements (e.g. Finnish). Which f-features are assigned to the nominal is a language-specific property (though there are strong universal tendencies, examined by Koptjevskaja-Tamm 1993).

One particularly intriguing phenomenon is the way in which a nominalization retains more of its verb-like features within the VP nexus while the ‘higher’ features of those of a nominal (cf Bresnan 1997, Zucchi, 1993). This is illustrated in the paradigm given in (35):

(35) a. Tom’s shooting of the lion
    b. Tom’s shooting the lion
    c. Tom shooting the lion
    d. *Tom shooting of the lion

This is not surprising given that the whole point of a nominal is to be a noun for the purposes of NP external syntax. The nominal can, however, afford to remain a verb deeper inside its own phrase. (See Bresnan 1997 for further discussion.) However, this doesn’t actually explain why structures such as (35d) should be almost vanishingly rare typologically. Koptjevskaja-Tamm (1993) notes only three cases. In two (Tongan and Samoan) the subject nominal is marked with the Ergative case postposition. However, this marker has, arguably, developed fairly recently from the marker of the implicit argument of a passive, at a time when the languages had an
accusative rather than an ergative system. If this is so, we might prefer to say that the Ergative case marker was really the equivalent of English by in the shooting of the lions by the hunter. The other example is from Classical Arabic, in a construction which is completely marginal in the modern standard, and which is therefore rather difficult to investigate.

In Spencer (1997a, b, 1998) I propose an explanation for the pattern in (35) which hinges on the hierarchical nature of a-structure representations. The basic outline is very simple. We assume that the a-structure representation is along the lines of (36):

(36) 
\[(x) R (E)\]

The syntactic representations of (35) are shown in (37):

(37) a. 
\[\text{Tom} \quad (x^+)R^+(E)(y^+)\]
\[\text{shooting} \quad \text{lion}\]

b. 
\[\text{Tom} \quad (x^+)R^+(E^*)(y^*)\]
\[\text{shooting} \quad \text{lion}\]

c. 
\[\text{Tom} \quad (x^*)R(E^*)(y^*)\]
\[\text{shooting} \quad \text{lion}\]

d. 
\[\text{Tom} \quad (x^*)R^+(E^*)(y^+)\]
\[\text{shooting} \quad \text{lion}\]

The category of the nominalization is given by its articulated a-structure. Licensing of subject/objecthood is indicated by a subscripting convention: X+ indicates <R> features (noun-like realization of arguments) and X* indicates <E> features (verb-like exponence). The least ‘mixed’ representations are those corresponding to (35a, c). In (37a) the <R> role licenses the expression of both subject and object arguments (x, y). In (37b) it is the <E> role that is responsible for the expression of the arguments, and this form is, of course, the most verb like. In (37c) we see the representation of a
genuinely mixed category in that the argument in the lower structure, the internal argument, is licensed by <E> but the upper argument is licensed by <R> (for this it is not crucial whether the subject argument is external or implicit, merely that it not be an internal argument and hence not in the domain of the <E> role). We can think of (37c) as respecting Strict Cyclicity: exponence is verb-driven at the ‘VP’ level and noun-driven at the ‘clause’ level. However, in (37d) we see a violation of this Strict Cyclicity. At the level of internal argument the <R> role is responsible for licensing, but then at for the subject we revert to the demoted <E> level5.

5 Conclusions

The main claims of this paper are that lexical syntactic category features are entirely redundant, given certain widespread assumptions about argument structure representation. Zwart’s (1992) claim that lexical categories systematically lack a referential argument in certain uses has been shown to be problematical. But if the referential argument is always present then there is complete overlap between this and syntactic category features. In theories which appeal to something like a level of a-structure the referential argument can be given an important role in the syntactico-semantic combinatorics. It is hard to see what role syntactic category features play in such theories. In particular, strict subcategorization is nowadays widely regarded as semantically or functionally driven. Where morphosyntactic features are claimed to play a role there is rarely any suggestion that these have to be major lexical category features. Now, I am not ruling out the possibility that there may have be reference to what are extensionally the major categories. Maling (1981), for instance, discusses the historical shift of like and worth from adjective to preposition due to morphosyntactic reanalysis. But it is not obvious that this requires reference to purely syntactic category features: the reanalysis can just as easily be defined over the r-role of a-structures. Similarly, in English there are some collocations of N + N (such as sea level) and others of RelAdj + N (marine biology) and others which allow either (marine/sea pollution, temperature, ...). Does this mean that we need reference to the categories N and A6? The question of how collocations are handled in grammar (if indeed this is a grammatical phenomenon) is as yet unresolved, though if reference to categories is required there is nothing to prevent us from stating this at the level of a-structure. In the case of sea level the real question is how this comes to ‘block’ the would-be synonym *marine level, and there is no reason why the answer to this has to make any appeal to any kind of category.

In addition, the approach here provides a motivated way of handling ‘mixed’ categories, and especially deverbal nominalizations. By adopting the widespread assumption that a-structures have a certain degree of articulated structure we can

5 Constructions related to deverbal nominals such as these are the verbal nouns of Celtic languages (cf. Bresnan 1997 on Welsh) and the ‘preverbs’ of light verb constructions (e.g. the benkyoo of Japanese benkyoo suru ‘to study (lit. study-do)’. In many cases it is apparent that the preverb has certain verb argument structure properties, (indeed, in many languages it is clearly a nominalization), but lacks verb features. Assigning syntactic category labels to such preverbs is embarrassingly arbitrary, but the problem evaporates if there are no syntactic class features to assign, and the grammar simply has to specify the relationship between the a-structure elements of the preverb and the a-structure representation of the light verb/auxiliary or whatever.

6 I am grateful to Nigel Vincent for raising this question.
account for the typologically robust facts relating to the expression of arguments in nominals.

There remain a variety of alternations which I have not mentioned but which arguably could be fruitfully investigated within this framework. One question concerns productive deverbal nominalizations referring to subject or object arguments (employer, employee). We might wish to handle at least some such cases in terms of addition of the <R> role, with coindexation to a thematic role. A further phenomenon worth investigating is those cases in which the <R> or <A> role of a noun or adjective is displaced by an <E> role. This would give us denominal verbs (such as to skin, to saddle, to shelve) and deadjectival verbs (causatives and inchoatives such as thicken). These have been the subject of no little debate, and it is not obvious how they fit the proposals advanced here. Of particular interest is the relationship between causative and inchoative deadjectival verbs. Additionally, one might wish to argue that in some cases an r-role can be displaced by a role of the same type. This would give us denominal nominalizations such as boyhood (in the case of <R: R>) and various types of complex predicate involving verbal predicates composed with other verbs (<E: E>). Arguably, this would be the way to represent synthetic causatives, for instance, and, indeed, the proposals of Wunderlich (1997) could be reconstrued in this light.

To summarize the broader claims: all contentives have a referential role in a-structure, which is coindexed in various ways in the syntax or at the syntax-semantics interface. This role triggers the appearance of f-features. All reference to major syntactic categories can be couched in terms of such referential roles, so purely syntactic category features are redundant. The only syntactic features needed are functional features. Cases of category changing inflection, as well as some cases usually treated as derivation, are operations over referential roles, in which the original role is ‘demoted’ and another role added. Both the ‘demoted’ referential role and the new role may trigger specific sets of f-features, resulting in ‘mixed’ categories.

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