Andrew Spencer, University of Essex
spena@essex.ac.uk

RELATIONAL ADJECTIVES AND THE REDUNDANCY OF LEXICAL CATEGORIES

Abstract

In this paper I argue that the familiar lexical category labels, N, V, A, P or equivalent feature systems (e.g. [±N, ±V]) are redundant in a theory which admits a level of argument structure. I modify Zwarts' (1992) conception of a-structure by arguing that major class members always include a 'referential role': <R> for nouns, <E> ('eventuality') for verbs and 'A' ('attributive') for adjectives The <A> r-role is coindexed with the <R> role of the noun modified. Reference to categorial information can be read off the a-structure representations without the need for purely syntactic category features. 'Transpositions', in which just the syntactic category is shifted, are operations over a-structures. I illustrate this system in detail with respect to relational adjectives. I first develop a (constructional) semantics for compound nouns (N N) in which the modifier receives a new <A> role, with demotion of the original <R> role: *atom* <A: R> *bomb* <R>. Relational adjectives have the same a-structure representation with the same semantic interpretation, but lexically specified: *atomic* <A: R> *bomb* <R>.

1. Introduction[1]

In this paper I assume that the representation of a predicate includes a level of a(gument)-structure (cf Williams 1981). 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 (1985) 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

[1] I am grateful to the Economic and Social Research Council for supporting the research reported here, Project no. R000236115. Thanks to David Adger for alerting me to Zwarts 1992. This paper was also read to the meeting of the Associação Portuguesa de Lingüística, University of Lisbon, 1 October 1997and will appear in the Proceedings. Thanks to Keith Brown for detailed discussion of earlier versions and also to participants in seminars at the University of Essex, the Workshop on Inflection, 8th Morphology Conference, Vienna, 6th February, 1996, the Research Centre for English and Applied Linguistics, Cambridge, the LAGB Spring 1997 meeting (Edinburgh), the ESRC-funded 'Challenges for Inflection Description' (18 April 1997), particularly Roger Evans and Gerald Gazdar, and Lexical Functional Grammar '97, University of California, San Diego, particularly Joan Bresnan, Phil LeSourd, Joan Maling, Nigel Vincent.

discharges its semantic role onto a complement or subject. Adjectives are generally assumed to be one- or two-place predicates which have semantic roles akin to those of verbs, 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 (ignoring prepositions):

(1) 'Traditional' PAS representations for transitive V, N, A:

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

There is 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 'notional' parts of speech tradition: 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 of 'mixed categories' such as deverbal nominalizations, or in denominal adjectives. That is particularly true of theories which make use of mapping principles governing argument realization (the Theta Criterion, Function-Argument Biuniqueness etc.), 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 argument selection.

The thesis to be defended here is that, given a level of a-structure, lexical syntactic category features such as [±N, ±V] or their equivalent are entirely superfluous, their place taken by the . Lexical categories can be defined in terms of their 'r(eferential)'-roles. 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 codicils.

This perspective throws light on the problem of distinguishing inflection and derivation. One rather serious problem is the existence of inflectional morphology which changes syntactic category such as 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, infinitives and deverbal nominalizations ('action nominals'), which in many languages inflect rather like nouns (in taking case endings, for instance) pose another well-known problem (cf 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):

(2)	N	→	Adj	relational adjectives
	V	→	Adj	participles
	V	→	Adv? N?	gerunds
	V, A	→	N	action nominals (incl. infinitives)

Consider for instance, deverbal action nominals. As is clear from typological surveys such as Koptjevskaja-Tamm (1993), the action nominal may retain a number of a-structure properties from the original verb (such as licensing subject- and object-like satellites), may assign the same quirky case to its object as the original verb (as when nominalizations of Russian transitive verbs with Instrumental case marked objects continue to assign the Instrumental to their complements), may retain tense marking (Turkish, Quechua) or aspect (Polish) and so on. For this reason nominalizations are often called 'mixed categories' (Lefebvre and Muysken 1988). Where the nominal simply names the event denoted by the verb, to what extent are we justified in saying that the nominal is the result of derivational as opposed to inflectional morphology? In other words, in *the shooting of the lions by the hunter* why can *shooting* not be a word form of the lexeme *shoot*? This problem is particularly acute in a language like German in which the commonest and most productive action nominal is the infinitive form of the verb (NB!) used as a noun, i.e. bearing nominal features of determination and case and being modified by adjectives.

I shall argue here that these problems largely evaporate if we admit that there are no syntactic lexical categories. Category-changing inflection is a 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: *shooting* <R: E, Ag, Th>. Language-particular principles then determine whether the <R> role or the <E> role is responsible for licensing arguments, tense/aspect features and so on.

In this paper I shall concentrate primarily on attributive modifiers and explore the relationship between N + N compounding in English and relational adjectives[2]. I begin with a survey of Zwarts' (1992) exploration of the homologies between syntactic structures and semantic structures.

2. Zwarts' model

Zwarts (1992) proposes a theory of lexical categories in which there is considerable redundancy between semantic and syntactic representation. He assumes a standard type-theoretic semantics together with a level of a-structure. A-structure representations are headed. He proposes that the four major categories of N V A P have a *referential argument position*, or 'r-role' as shown in (3):

[2] A treatment of nominalizations is given in Spencer (1998).

(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

'R' and 'E' have their familiar interpretation. 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)[3].

The referential roles help distinguish 'sorts' of predicates and in this sense are entirely different in function from the thematic 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 referential arguments. The other function of the referential arguments is to serve as the locus of 'theta discharge' (Higginbotham 1985). It is the r-role which is bound by determiners, tense operators, degree modifiers and so on. It is also the position which is coindexed with argument positions of predicators. 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-roles 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*.

This would give us a one-one correspondence between syntactic category labels and r-roles, so the syntactic categories seem to be redundant. However, Zwarts argues that proper nouns, stative verbs and non-gradable adjectives differ from their canonical counterparts in lacking a referential argument. 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. This gives us the subclasses shown in (4):

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

I will briefly consider in turn each of the three categories for which this proposal is made.

In Spencer (to appear) I show that there are problems with this interpretation. For instance, if proper nouns lack the r-role, then we no longer have a uniform account of theta discharge to nominal arguments: *John* in *hit John* has to be theta-marked by a different mechanism from that which marks *the man* in *hit the man*. Similarly, if stative verbs lack an E-role then the theta binding by the Tense operator has to be given a gratuitously disjunctive definition (as in Zwarts 1992:131).

---

[3] I ignore prepositions here.

For adjectives, Zwarts 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*. Zwarts, 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 referential role in their a-structure. In order to express the fact that non-measure gradable adjectives like *pretty* can still receive degree modification (*very pretty*) Zwarts assumes type shifting. The type of simple properties will be e_P, corresponding to an argument structure with just a Theme role, <Th(x)>, while the type of measure adjectives such as *tall* is $\langle e_D, t \rangle$, where e_D is the type of degrees, with a-structure <G: Th(x)>. Thus, by shifting from *pretty* $\langle e_P \rangle$ to *pretty* $\langle e_D, t \rangle$ we obtain an argument structure <G: Th(x)> for *pretty* and this maps a property to the set of degrees that realize that property. (Type shifting also accounts for cases in which proper nouns are modified, e.g *the young Einstein*).

What remains unclear 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):

(5) $\exists d[\textbf{tall}'(x, d) \,\&\, d > dA]$

where *dA* 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: 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 obvious that *pretty* is a non-measure adjective, witness (6):

(6) Anna is twice as pretty as Bella

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

(7) x is more adj than y $\Rightarrow$ x 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 to

measure goodness. Likewise, there are measure adjectives which are not syncategorematic and in which entailment (7) therefore holds, as in (8):

(8) Your account is five pounds overdrawn ⇒ Your account is overdrawn

Thus, gradability is a matter for LCS representations (or perhaps encyclopaedic knowledge) and not an a-structure property.

We now turn to the nature of modification. Zwarts 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. An example with an intransitive adjective is (10):

(10) a. tall woman
b. tall<G: Th_i> woman<R_i>
c. λx[**tall'**<G: Th(x)> & **woman'**(x)]

Note that Zwarts' 'G' argument plays no role whatever in theta discharge here.

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 a new r-role, 'A', for adjectives which expresses their canonical function as attributive modifiers, replacing Zwarts' 'G' role.

3. 1 Compounds and relational adjectives

It seems to be widely accepted that compounds such as *atom bomb* are interpreted pragmatically (Downing 1977). The simplest way to account for such meanings is to assume that the compound construction itself was associated with an unspecified predicate, ρ, which asserts some pragmatically defined relationship between the denotata of the two nouns (cf Spencer, 1995), as in (11):

(11) λρλx[[**bomb'**(x)] & ρ(λw[w=x], λy[**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. The semantic interpretation provides the modifier with the representation shown in (12):

(12) $\lambda P \lambda \rho \lambda z[P(z) \& \rho(\lambda w[w=z], \lambda y[\mathbf{atom'}(y)])]$

The constructional meaning of a compound noun is given explicitly in (13):

(13) $N_1\langle R_1\rangle$ in the construction $[N_1\langle R_i\rangle, N_2\langle R_i\rangle]$
corresponds to $\lambda P \lambda \rho \lambda z[P(z) \& \rho(\lambda w[w=z], \lambda y[\mathbf{noun'}(y)])]$
where $\mathbf{noun_1'}$ is the denotation of N_1

This means that the representation for *atom bomb* will be (14), which after λ-conversion collapses to (11):

(14) $\lambda P \lambda \rho \lambda z[P(z) \& \rho(\lambda w[w=z], \lambda y[\mathbf{atom'}(y)])](\lambda x[\mathbf{bomb'}(x)])$

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

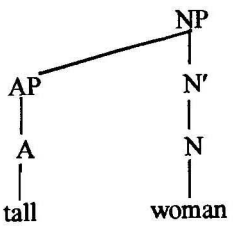
(15) a. London fog
b. London$\langle R_i\rangle$ fog$\langle R_i\rangle$
c. $\lambda P \lambda \rho \lambda z[P(z) \& \rho(\lambda w[w=z], \lambda y[\mathbf{london'}(y)])](\lambda x[\mathbf{fog'}(x)])$

The representation yielded by (13) 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:

Zwarts 'G' r-role fails to bring out the principal function of adjectives, that of attributive modification. Let us therefore take all adjectives to have an ***attribute*** referential role, A, coindexed with the prominent argument. When modification occurs within a nominal phrase, the r-role, <A>, of the attribute is theta identified with the <R> of the modified noun, indirectly establishing a coindexation between the prominent argument of the adjective and the noun's referent, as shown in (16):

(16) a.



$\langle A_i\ Th(x_i)\rangle$ $\langle R_i\rangle$

b. $\lambda x[\textbf{tall}'(x) \quad \& \quad \textbf{woman}'(x)]$

The default interpretation for (16) is given in (17):

(17) adj<A_i: x_i> translates as $\lambda Q \lambda x[\textbf{adj}'(x) \& Q(x)]$

Applied to *woman* (translation $\lambda z[\textbf{woman}'(z)]$) an adjective such as *tall* will give (18):

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

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*? That is, could we say that the relationship between the relational adjective *atomic* and the noun *atom* results from an operation over the LCS representation of the noun? This would mean, for instance, 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 element 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 ρ 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 r-role <A> which then coindexes with the base noun's r-role <R>, as shown in (19):

(19) atomic: atom<A_i: R_i>

This can now be interpreted in the same way as the modifier in a compound noun, as in (20):

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

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 (21), essentially as for *atom bomb*:

(21) a. atom<A_i: R_i> bomb<R_i> ⇒

b. λPλρλz[P(z) & ρ(λw[w=z], λy[**atom'**(y)])](λx[**bomb'**(x)]) ⇒

c. λρλz[**bomb'**(z) & ρ(λw[w=z], λy[**atom'**(y)])

The basic interpretation of *atomic* is identical to that of the noun from which it derives, hence, (21b,c) make reference to the property λy[**atom'**(y)] and not the property λy[**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.

Finally, how do we account for the fact that modifying nouns in compounds can (sometimes) be modified by adjectives, just like ordinary nouns (e.g. *red brick house*, *American history teacher = teacher of American history*)[4]? First, we form the phrase *red brick*. This is headed by a noun, though one which is modified by an adjective: *red*<A_i: Th(x_i)>(*brick*<R_i>). Then, the compound N interpretation rule converts the noun into a relational adjective to give (22):

(22) [*red*<A_i: Th(x_i)>(*brick*<A_j: R_i>)](*house* <R_j>)

This process is rare if the phrase is not listed (cf. **expensive brick house* in the sense *house made from expensive bricks*). This account of relational adjectives provides us with an unexpected solution to an intriguing problem. An expression such as *East German economy* illustrates a well-discussed kind morphosemantic structural mismatch: *East German* is clearly an adjectival form (essentially a relational adjective) derived from *East Germany*. But a part of what *East* is supposed to modify is lacking:

(23) a. [$_N$East Germany] b. [$_A$[$_N$East 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 (23b)) to be simply a form of the lexeme *Germany* then we can offer the analysis in (24), corresponding to (25):

(24) EAST<A> GERMANY<R> ⇒ EAST<A_i> GERMANY<A_j: R_i> (ECONOMY<R_j>)

East Germany ⇒ East German (economy)

(25) GERMANY<R> ⇒ GERMANY<A_j: R> (ECONOMY<R_j>)

Germany ⇒ German (economy)

---

[4] I am grateful to Phil LeSourd for discussion of this point.

The forms in small capitals in (25) are names of lexemes irrespect 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).

References

Downing, Pamela (1977). On the creation and use of English nominal compounds. *Language* 55: 810-42.

Haspelmath, Martin 1996. Word-class-changing inflection and morphological theory. In: G. Booij and J. van Marle (eds.) *Yearbook of Morphology 1995*, Dordrecht: Kluwer Academic Publishers, 43-66.

Higginbotham, James 1985. On semantics. *Linguistic Inquiry* 16, 547-621.

Jackendoff, Ray, S 1990. *Semantic Structures.* Cambridge, MA: MIT Press.

Koptjevskaja-Tamm, Maria 1993. *Nominalizations*. London: Routledge.

Lefebvre, Claire and Muysken, Pieter 1988. *Mixed Categories*. Dordrecht: Kluwer Academic Publishers.

Spencer, Andrew 1995. Noun incorporation in English. Talk given to the Workshop on Noun Incorporation at the Inaugural Meeting of the Association of Linguistic Typology, Filologia eta Geografia-Historica Fakultatea, Euskal Herriko Unibersitatea, Vitoria-Gasteiz, 8 September 1995.

Spencer, Andrew (to appear). The redundancy of lexical categories. In Andrew Radford (ed.): Studies presented to Prof. Keith Brown on the occasion of his retirement. Essex Research Reports in Linguistics.

Williams, Edwin 1981. Argument structure and morphology. *The Linguistic Review* 1: 18-114.

Zwarts, Joost 1992. *X'-Syntax - X'-Semantics: On the Interpretation of Functional and Lexical Heads*. Utrecht: Onderzoeksinstituut voor Taal en Spraak.