

Theme 7: NOUN PHRASE STRUCTURE  
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THE HEAD OF THE NOUN PHRASE:  
EVIDENCE FROM RUSSIAN NUMERAL  
EXPRESSIONS

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In the work of our theme group on the structure of the noun phrase, it has been generally assumed that the head of the noun phrase is the noun. This is the traditional, common-sense view. But we must bear in mind that the definition of the notion 'head' has been considered seriously only relatively recently, and that the decision as to what is head in particular cases may depend on the theoretical position adopted. For these reasons it seemed worth circulating a paper devoted to an attempt to determine the head of a difficult construction. It will be seen that if a particular approach is followed through - one which attempts to maximize the simplicity and consistency of headedness relations - then the result may be the opposite of that expected. The notion head, therefore, is much less straightforward than is sometimes imagined. In practical terms, this means that in discussion of particular types of noun phrase we must be careful to say which element we take to be the head, and not to assume that the identity of the head of a noun phrase is generally accepted across different theories.

The debate on headedness has concentrated on determining the head in different constructions and on establishing acceptable criteria to enable us to do so.<sup>1</sup> The data have been taken mainly from English, and so this paper, by contrast, extends the investigation to a language with a much richer morphological system than that of English, namely Russian. We shall concentrate on numeral expressions in Russian, where the head-dependent relation has long been known to be problematic (see for example, Isačenko 1962:529). We shall examine them in the light of the criteria for heads proposed by Zwicky (1985) and by Hudson (1987).<sup>2</sup> At first sight it seems evident that no single head can be identified for these constructions, rather the properties of the head appear to be shared between different elements, which would fit with Zwicky's approach. However, given current assumptions about lexical entries and feature distribution, these constructions can be analysed as being rather less exotic than they first appear, and as having a consistent head, as Hudson would predict. While attempting to remain as theory-neutral as possible, we shall develop the analysis to see

<sup>1</sup> I am grateful to members of the EURO TYP Theme Group on Noun Phrase Structure for helpful discussion of some of the issues raised in this paper.

<sup>2</sup> An important addition to their debate can be found in Warner (1989).

whether the idea of a single element having all the head properties can be maintained. It is in focussing on the question of headedness that the paper differs from most previous accounts of Russian numeral phrases. We shall see that there are two types of consequence. The first is that we still need to recognise that headedness is a gradient notion: a particular element may have head-like characteristics to a greater or lesser degree, and that these may vary according to external factors (case assignment). The second is that the logic of the analysis requires reassessment of the head-dependent relation elsewhere, in adjective-noun constructions, and the price to be paid here may be unacceptably high.

### 1. Headedness in numeral expressions in Russian

A great deal has been written on the complex syntax of numeral expressions in Russian, sometimes with comparative data from other Slavonic languages; see, for example, Suprun (1959; 1969), Worth (1959), Corbett (1978a; 1983:215-40), Meičuk (1985), Babby (1987), Miller (1988; 1989) and references there. The simple cardinal numerals show great variety in their behaviour, but there is a clear pattern to the differences: namely that the larger the numeral, the more closely its syntactic behaviour approximates to that of a noun. Thus *odin* 'one' closely follows adjectives in its syntax, agreeing in gender (including the subgender of animacy), case, and even number with the quantified noun. *Million* 'million', on the other hand, does not agree with the quantified noun, but has a full paradigm, singular and plural (with the plural denoting more than one million), it imposes genitive case on the quantified noun and may itself, if rarely, take a determiner which agrees fully with it. Numerals in the middle numerical range, such as *pjat'* 'five' fall between these syntactic extremes. In this way Russian provides particularly good evidence for a claimed universal, namely that if there is any variation in the syntactic behaviour of simple cardinal numerals, then the higher numerals will show more noun-like behaviour (Corbett 1978a:363; Hurford 1987:187-97).

These data create two problems for the notion of head. First, if head is linked to semantic notions (such as argument-functor), then we must assume that the semantic relations in *odin rubl'* 'one rouble' and *million rublej* are similar, yet the syntax is very different. *Odin* agrees fully with the noun (it is nominative

singular masculine), while *million* imposes genitive case on the noun *rublej* (genitive plural), even though the phrase as a whole counts as nominative. The second problem is that with some of the intermediate numerals the relations within the noun phrase are complex, so that it appears difficult to establish a single head of the phrase. This should not surprise us too much, since other apparently monolithic notions such as 'subject' have been found to consist of clusters of properties which may be shared among more than one element.

We shall concentrate on the second problem, by looking at the most complex of the numerals, *dva* 'two', *tri* 'three' and *četyre* 'four'. The syntax of these three is similar; differences will be pointed out at the appropriate points. Let us start from the apparently simple phrase *dva žurnala* 'two magazines' and consider the head-dependent relationship. The phrase as given would fit into a sentence slot requiring a nominative or accusative constituent; *dva* 'two' is in the nominative-accusative form, while *žurnala* 'magazine' stands in the genitive singular (the nominative singular is *žurnal*). We will consider the criteria discussed by Zwicky (1985) and Hudson (1987).<sup>3</sup>

### 1.1. The semantic argument.

This criterion requires us to consider the semantic interpretation of the phrase and to ask which element has the status of argument. While not so obvious as for other types of phrase, it would appear that when we look at the semantic relation between the two items in the Russian phrase in question, the semantic argument is *žurnala* 'magazine(s)', and the functor is *dva* 'two'. For Zwicky this indicates that *žurnala* is the head; for Hudson, however, this shows that *dva*, the functor, is the head.

### 1.2. The subcategorizand.

The subcategorizand is *dva*; it subcategorizes for a nominal phrase headed by a count noun (though that noun stands in the singular). On Zwicky's and on Hudson's view of this criterion *dva* is the head and the nominal phrase which includes the noun is the dependent. 'Nominal phrase' is a hedging term to denote the noun

<sup>3</sup> See also Me1'čuk (1985:326-61) who distinguishes three types of head-dependent relation: morphological, syntactic and semantic, and suggests that they may or may not be parallel to each other.

and its immediate modifiers. The noun may have various such modifiers (for example: *dva novyx žurnala* 'two new magazines') but it is uncommon for demonstratives (like *ětot* 'this') and possessives (like *moj*) to be included - these more commonly occur before the numeral (*moi dva žurnala* 'my two magazines'). This suggests that a phrase like *moi dva novyx žurnala* 'my two new magazines' constitutes a single complex noun phrase: *novyx žurnala* forms a nominal phrase, this phrase forms a larger phrase together with *dva*, and that whole phrase in turn is modified by *moi*: [*moi* [*dva* [*novyx žurnala*]]]. We shall consider these modifiers in more detail in section 2.

### 1.3. The morphosyntactic locus

Here we must consider which element can bear 'the morphosyntactic marks of syntactic relations between the construct and other syntactic units' (Zwicky 1985:6). The morphosyntactic mark in question is that of case, and the stronger contender appears to be *dva* since it stands in the case appropriate to the slot filled by the construct as a whole.

Although *žurnala* appears to be a non-starter, since it stands in the genitive singular, there are arguments to be made in its favour. First, if we look at the oblique cases, we find that numeral and noun stand in the same case, for example *o dvux žurnalax* 'concerning two magazines' where numeral and noun are in the locative (note that *žurnalax* is locative plural), governed by the preposition *o*. So the better claim of *dva* rests on the direct cases (nominative, and accusative when identical to the nominative). Even here we could argue that *žurnala* indicates the appropriate case, if we claim that it carries an exceptional marker, say [dual] as suggested by Dingwall (1969:227-9), and that in the presence of this marker its (genitive singular) form is an indicator of the nominative (and accusative=nominative). There is overwhelming evidence that some sort of exceptional marker is required. First there are a few nouns which have a special form used just in this construction, for example *dva časá* 'two hours, two o'clock' where the genitive singular has a different stress *časá*. Furthermore, there are occasional examples of the use of the nominative plural, rather than the genitive singular with feminine nouns. (For many feminine nouns

the genitive singular and nominative plural are identical; they may differ in stress and when they do normally the genitive singular is used; the exceptional cases mentioned here involve use of the nominative plural differentiated by stress from the genitive singular.)<sup>4</sup> Thus nouns bearing the exceptional marker [dual] do not always take the form of the genitive singular, though the majority do. And second, as we shall see, modifiers of nouns bearing this marker, even though the noun stands in what looks like the regular genitive singular, do not take genitive singular modifiers. As far as headedness is concerned, even if we accept the argument based on the exceptional feature, the fact remains that the interpretation of the morphological mark of the genitive (for most nouns) as nominative would depend on the numeral being present. On a generous reading this might make the noun as head-like as the numeral, but it could not possibly count as an argument in favour of the noun.

We conclude that the better claim to be the morphosyntactic locus is that of *dva*, though the situation is not absolutely clear-cut. For both Zwicky and Hudson this would imply that *dva* is the head.

#### 1.4. The governor

Insofar as there is a governor, it is clearly *dva*. As we saw above, it governs the genitive singular of the noun (provided it itself is in a direct case). For reasons just discussed, it seems that this government consists of imposing an irregular marker [dual] on the noun, which is normally realized as genitive singular. It might be argued that *dva* itself is dual, and so we are dealing with agreement (but note that 'dual' is no more than a mnemonic for an irregular marker since *tri* 'three' and *četyre* 'four' are also involved). While historically this is so, it cannot be maintained for the modern language since *žurnala* cannot be used as a free form to mean 'two-four magazines'. We are indeed dealing with government by the numeral. For both Zwicky and Hudson this again suggests that *dva* is the head.

<sup>4</sup> In addition, nouns which decline as adjectives show exceptional behaviour here. For example, *nasekomoe* 'insect' behaves syntactically like a noun, but declines like a neuter adjective. In constructions with numerals like *dva*, such nouns behave like adjectives (see section 2 below) and stand in the plural: *dva nasekomyx* (genitive plural) 'two insects' not \**dva nasekomogo* (genitive singular) 'two insects' Mel'čuk (1985:168).

#### 1.5. The determinant of concord (agreement controller)

The question of agreement is particularly interesting in these constructions. The agreement controller is clearly the noun, as is evident when we look at accusative case forms. For inanimate nouns like *žurnal*, the accusative is identical to the nominative form already given. If we take an animate noun we find the following form: *dvux studentov* 'two students'. This is identical to the genitive, following the regular syncretism in Russian for the subgender of animacy. Note that it applies to all three genders, and that *studentov* is genitive plural. Thus the noun is the agreement controller and the numeral is the target.

If we look again at the nominative, we find more of interest. The form already given, *dva*, is appropriate for the masculine and the neuter, while for feminine nouns we find *dve*, as in *dve knigi* 'two books'. This situation runs counter to the regular agreement patterns of Russian. The normal situation for adjectives and pronouns is that three genders are distinguished in the singular, but there is no distinction in the plural. *Dva* is odd in having two forms, one for masculine and neuter, and the other for the feminine (this is shared with *oba/obe* 'both' only - *tri* and *četyre* have no distinct gender forms). It is also odd in having gender agreement in the nominative (and nominative/accusative) only.<sup>5</sup> My earlier analysis (Corbett 1978b:7) was in process terms, and looked for economy in feature copying. If *dve* is seen as imposing the dual marker (to be realised as genitive singular) on the noun, the noun is 'now' singular and so agreement in gender is possible. Thus we have a negotiation of features, the numeral imposes case and number on the noun, which in turn determines the gender of the numeral. This appears exotic, but largely because it occurs within the noun phrase. A similar situation occurs in subject-predicate relations: Russian verbs normally take subjects in the nominative, with which they 'then' agree but some, mainly negated, verbs have genitive subjects with which they cannot agree and so have default (neuter singular) agreement forms.

<sup>5</sup> *Oba* 'both' has distinct feminine forms as opposed to masculine and neuter right through the paradigm; however, these survive largely in the written language, while in the spoken language the masculine/neuter forms are used for the feminine in the oblique cases, giving a situation just like that of *dva*.

In several current frameworks, however, there is no concern to impose specific restrictions on the feature information available in particular constructions. Since the lexical entry of a noun contains information on gender (whether specified or derivable from other lexical information), this information is considered to be available when the noun is plural, even though such information is not normally required. The oddity of the construction in this regard can be seen as reducing to the extremely unusual lexical entry required for *dva*, which specifies the need for information on the gender of nouns, even though plural; *dva* is, of course, a high-frequency word and so this irregularity is maintained.

We have established that the numeral agrees with the noun, albeit in a highly idiosyncratic way. For Zwicky, this is evidence that the noun is the head. Hudson (1987:117) proposes to disregard agreement: 'the direction of concord determination has nothing at all to do with the notion "head"'. This seems a step backwards, since there is a degree of consensus on what can agree with what, as reflected for example in the Control Agreement Principle of GPSG. Moreover, the fact that the agreement controller is not always the head is not necessarily as damaging to Hudson's case as perhaps he thought. Nichols (1985) shows that in various languages there are instances of 'upwards' agreement, where heads agree with dependents.

If the VP is taken to be the head of the sentence, and the subject NP a dependent with which it agrees, then we could argue that in Russian we expect the agreement target to be the head. Since the numeral agrees with the noun, this suggests it is the head of the phrase. Such a position is logical, though it goes against the tradition of Slavists, for whom head and agreement controller would, I think, be expected to coincide.<sup>6</sup> Moreover, given the pervasive nature of agreement in Slavonic languages, this criterion would be taken as a fundamental one, and hence many Slavists would be unwilling to consider the possibility of the numeral being the head of the phrase. If, however, the VP is recognised as head of the sentence then the logic is inescapable.

<sup>6</sup> Thus Babby (1987:101-12) considers which element is the head of Russian quantified expressions (and concludes that it is the noun), but uses only agreement and case-assignment as tests.

### 1.6. *The distributional equivalent*

This operational criterion proves difficult to apply. The idea is that the head will be the element that belongs to a category 'with roughly the same distribution as the construct as a whole' (Zwicky 1985:11). In one sense, phrases like *dva žurnala* occur in most of the same positions as other nominal phrases and therefore the distributional equivalent would be the noun (see Mel'čuk 1985:63-72). In view of his treatment of Det + N constructions, Zwicky might well also take the noun to be the head. But when applied to Russian, such a view requires us to disregard morphology: thus in subject position phrases quantified by *dva* may take either singular or plural verb agreement, while most nominal phrases permit only one form of number agreement. If we take a strict approach, that is, to consider the distributional equivalent to be that element which can be substituted for the whole with no morphological adjustments, then we could not take the noun to be the distributional equivalent and hence head of the phrase. It could be argued that this is over-strict, since we are looking for *roughly* the same distribution.

Hudson (1987:118) indicates that morphology should not be ignored. However, he is happy to consider constructions which are elliptical (saying this is irrelevant for identifying distributional equivalence). If elliptical constructions are accepted, then the numeral too can be taken as the distributional equivalent of the phrase (compare Mel'čuk 1985:64).

Hudson also makes the point that many believe the head should have the same category features as the phrase (1987:123). This argument can lead in either direction since some treat the phrases we are analysing as some sort of noun phrase, while others treat them as quantifier phrases (QPs).

The distributional equivalence criterion can lend support to each of the contending heads. Judgement on this criterion depends critically on other assumptions: whether morphology can be disregarded, and whether elliptical constructions are to be taken into account.

### 1.7. *The obligatory constituent*

Here again, the criterion is not straightforward; this is true in

general terms, as Kornai and Pullum (1990:33-5) show, as well as in the specific circumstances here. As with the last criterion, judgement depends on our assumptions about disregarding morphology and taking account of elliptical constructions. If we disallow adjustments of the morphology, then the obligatory element is the numeral: we cannot omit the *dva* in *dva žurnala* since the genitive singular form of the noun could not occur in most of the contexts where the full phrase would be found. In the oblique cases, however, when both stand in the same case, then an argument could be made in favour of either constituent. But equally, the circumstances in which numerals can stand on their own in Russian are rather limited (Mel'čuk 1985:64-5), unless we include examples of ellipsis.<sup>7</sup> Zwicky (1985:13) suggests we should not take account of such examples, but Hudson (1987:118) disagrees. If we follow Zwicky, then the noun would be the head, in terms of being the obligatory element, while if we follow Hudson, then the numeral should be recognised as the obligatory element.<sup>8</sup>

#### 1.8. The ruler in dependency grammar

Zwicky (1985:14-15) considers the head-like notion which is central to dependency syntax and asks which element dependency grammarians normally select.<sup>9</sup> In our particular case this is easy to establish, since one of the main proponents of dependency syntax, Igor' Mel'čuk has written specifically on numeral constructions in Russian and has argued at length that the noun is the head (Mel'čuk 1985:59-104; note that this work was ready for publication in 1977; Iomdin 1979:37 agrees with Mel'čuk). Mel'čuk takes the crucial criterion to be distributional

<sup>7</sup> Miller (1989:4) treats this as the main criterion and takes the numeral to be the head, but the fact that numerals do not readily stand on their own in Russian means an argument based just on this criterion is somewhat weak. In some instances collective numerals are substituted (Mel'čuk 1985:379-90).

<sup>8</sup> Zemskaja and Kapanadze (1978:292-5) give numerous examples from colloquial Russian of numeral without noun in the buying of tickets, for example *dva Zagorsk* 'two Zagorsk (two tickets to Zagorsk)'. In other circumstances the numeral *odin* 'one' (but not others) is frequently omitted, for example *čas* '(one) hour, (one) o'clock'.

<sup>9</sup> For earlier discussion of the problem, based on a range of languages, see Kibrik (1977).

equivalence. However, if we adopt the innovations to dependency syntax introduced by Hudson, then following his argument (1987:126-9) we could well argue that the numeral is the ruler, as is claimed specifically for Russian by Miller (1989); see the latter paper for the technicalities of one way of dealing with the necessary features in a dependency account.

Let us consider the results so far. Table 1 shows the element which is head, according to the criteria of Zwicky and Hudson. It should be stressed that this is my interpretation of the criteria they proposed in the papers cited.

Table 1: The head element in Russian numeral phrases  
(*dva žurnala*)

critterion	Zwicky (1985)	Hudson (1987)
1. Semantic argument (Z) vs. functor (H) <sup>10</sup>	noun	numeral
2. Subcategorizand	numeral	numeral
3. Morphosyntactic locus	numeral	numeral
4. Governor	numeral	numeral
5. Determinant of concord (Z) vs. (target)	noun	(numeral) <sup>11</sup>
6. Distributional equivalent	noun	numeral
7. Obligatory constituent	noun	numeral
8. Ruler in dependency grammar	noun	numeral

The results of the investigation so far are revealing. If we apply Zwicky's criteria, then we find that the head-like properties are split between numeral and noun, which is what we might intuitively have expected. If we take Hudson's view of the criteria proposed by Zwicky, then we must conclude that *dva* is the head of phrases like *dva žurnala*. It is remarkable to reach such an unambiguous result and so, if we can maintain Hudson's approach we should do so. While the application of certain criteria is somewhat strained, this might be expected since the construction is clearly unusual in various respects.

It is worth distinguishing between the element which is the head

<sup>10</sup> For Zwicky the argument is head, for Hudson the functor.

<sup>11</sup> Recall that Hudson rejects this criterion hence the result is in parentheses. It is based on taking the agreement target to be the head.

'in principle' and the element which actually exhibits head-like behaviour. Thus if agreeing with the dependent is taken as a feature of head-like behaviour, then *dva* 'two' is more head-like than *tri* 'three' because *dva* shows minimal agreement in gender while *tri* does not. Furthermore, and rather surprisingly, the head-dependent relation is influenced by factors outside the phrase. Thus when the phrase is in one of the direct cases, *dva* governs the noun (requiring the irregular dual marker), but in the oblique cases both numeral and noun have the same case imposed from outside. There is no government in the oblique cases, and so the numeral is less head-like than in the direct cases.<sup>12</sup>

If we step back to look at the numeral system more generally, we could argue, if we follow Hudson's reasoning (and if we also reinstate agreement with the dependent as a head-like behaviour for Russian), that the numeral is always the head of phrases consisting of numeral plus nominal phrase (recall that we exclude pre-numeral items). Yet, as I have shown elsewhere (Corbett 1978a:356-9) Russian numerals show great diversity in their syntax. The diversity comes largely from the fact that as they become arithmetically larger, so the numerals show ever 'more' government and 'less' agreement. Thus *pjat'* governs the nominal phrase when in the direct cases, but stands in the same case in the oblique cases, and shows no agreement of gender (including animacy); *tysjačā* 'thousand' may behave in this way, or may take the genitive case in all instances, while *million* 'million' always takes the genitive case.

## 2. Adjectives within Russian numeral phrases

We have established that if we apply Zwicky's criteria we find that the possible characteristics of head-like behaviour are distributed between the numeral and noun in Russian, and this has some attractions given the complex nature of the relation between the two elements. But taking Hudson's approach, and allowing for the fact that some criteria are problematic, we find that the head-like properties are firmly attached to the numeral. If it can be maintained, this simpler analysis has much to commend it.

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<sup>12</sup> Neidle (1988:90-4), discussing numerals like *pjat'* 'five', goes so far as to treat the numeral as head in the direct cases, and the noun as head in the oblique, as does Miller (1988).

One way of testing the validity of the analyses presented so far is to introduce a third element into the construction. If the head-like properties are indeed shared, then we may expect problems when a third element is added. If, on the other hand, they are clear, then the third element may be expected to fit easily. A first try is to add a demonstrative, to give a phrase such as *èti dve knigi* 'these two books'. Here *èti* 'these' is a nominative plural form; if the case of the numeral is changed, *èti* will remain plural and will take the same case as the numeral. Following Zwicky's approach, we would say that its head is the numeral, while following Hudson's reasoning we would say that the demonstrative is the head of the phrase, with the numeral as its dependent. There are certain complications, but they cast little light on the relations between numeral and noun.

A second try is more successful, namely to add in an adjective. We shall see that the complexities we have seen so far are almost as nothing compared with those which arise when an adjective is added. In a phrase like like *dve interesnye knigi* 'two interesting books', *dve* 'two' is in the nominative (or accusative), *interesnye* 'interesting' is nominative plural, though the genitive plural *interesnyx* is also possible, while *knigi* 'book(s)' is genitive singular.<sup>13</sup> Before tackling the questions of why these two forms arise and what factors influence the choice between them we must first consider more generally how we would expect an attributive adjective to fit into the construction.

It seems natural to suggest that, in a phrase like that just given, we expect the adjective and noun to form a phrase and that this phrase should in turn be in some sort of relation to additional outside elements. What then, in general terms, is the relation between a noun and an attributive modifier. Zwicky and Hudson did not consider this relation. I have therefore given my interpretation using their criteria in Table 2.

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<sup>13</sup> *Knigi* is one of the type of nouns for which the genitive singular and nominative plural are identical.

Table 2: The head element in Russian adjective-noun combinations

critterion	Zwicky (1985)	Hudson (1987)
1. Semantic argument (Z) vs. functor (H)	noun	adjective
2. Subcategorizand	(neither)	(neither)
3. Morphosyntactic locus	(both)	(both)
4. Governor	(neither)	(neither)
5. Determinant of concord (Z) vs. (target)	noun	(adjective?)
6. Distributional equivalent	noun	?
7. Obligatory constituent	noun	?
8. Ruler in dependency grammar	noun	noun

Table 2 shows an interesting reversal of the situation found in Table 1. Using Zwicky's approach we obtain consistent results and there is little question but that the noun is the head of the adjective in a phrase like *interesnaja kniga* 'interesting book'. Both show the morphosyntactic mark of nominative case, to indicate the phrase's syntactic relation to other sentence elements, so criterion 3 is of no help here; neither is criterion 4, since government is not involved. But the remaining criteria point in the same direction. If we look at Hudson's approach the picture is less clear. The functor (and so the head) is the adjective. Hudson does not accept the relevance of concord, but since we found it consonant with other criteria when considering the numeral it is worth noting here that if the agreement target in this instance is the adjective. Criteria 6 and 7 at first sight suggest that the noun is head; but bearing in mind the different approach Hudson and Zwicky take to ellipsis, it is possible to claim, as Hudson does in the case of determiners, that these criteria do not produce a clear answer and that one can at least make a case for either element being the head.<sup>14</sup> The ruler in dependency syntax - which is the head for Hudson - is the noun: this is made clear for English in Hudson (1987:127-8). Thus for adjective-noun phrases we do not get a clear indication of the head in Hudson's approach. This is a disappointment since the analysis which radically simplifies the account of Russian numerals is undermined if straightforward adjective-noun phrases are problematic. To preserve the elegance of Hudson's

<sup>14</sup> In a discussion of determiners as heads, Hudson (1984:91) notes as problematic the fact that lexical nouns are also optional after ordinary adjectives.

approach it appears that the only possibility would be to claim that the adjective is the head in adjective-noun phrases, and so that the previous dependency analysis was incorrect. Making the adjective the head is a radical suggestion, but so indeed was the analysis which makes the numeral consistently head of the phrase. Furthermore it is not new, since it has been argued for, in a dependency approach to Russian, by Miller (1989), and much earlier, in relation to English, by Anderson (1976:86-126).<sup>15</sup>

Let us therefore analyse phrases like *dve interesnye knigi* 'two interesting books' with two questions in mind. First, recall our original question which was whether these phrases suggest that the head properties are shared between numeral and noun (as Zwicky's approach suggests) or whether they indicate that the numeral is the clear head. And second, given the situation summarized in Table 2, it is worth considering whether they allow an analysis in which *dve* is head of *interesnye*, which is in turn head of *knigi*?

Before going into details, we should outline the areas of difficulty. The option in case is found only when the numeral is in the nominative or accusative-nominative. In the oblique cases, numeral, adjective and noun all stand in the same case and the adjective is in the plural, like the noun. These oblique case forms do not take us further forward. In the direct cases, where the adjective can stand in the nominative or genitive plural, we must first establish why there is a choice at all, and then consider the factors which influence the choice.<sup>16</sup> The use of the nominative plural is the easier to understand. In a phrase such as *dve interesnye knigi* 'two interesting books' we would expect adjective and noun to be in the plural for semantic reasons. But we have seen that the numeral imposes an irregular marker by government, which, when interpreted in the morphological component, causes the noun to take the form of the genitive singular (sometimes, as with *knigi* 'books', the form is identical to the nominative plural). This irregular marker does not cause

<sup>15</sup> I am grateful to Frans Plank for bringing this reference to my attention.

<sup>16</sup> There is a whole range of such factors, for which see Gallis (1947:66-73), Suprun (1957), Worth (1959:122-5), Bogusławski (1966:237-40), Mel'čuk (1985:126-8); for the development of the construction see Iordanskij (1958), and for comparative data from Ukrainian see Šerech (1952: 124-38).

any change in the morphological form of the adjective and so the nominative plural results as expected. This effect does not provide evidence for the competing hypotheses we are considering. In a constituency model, the irregular feature (say [dual]) will be found on the node dominating the adjective and noun and so will be found on each; in the morphological component it is 'disregarded' in the case of the adjective, since there are no special forms for adjectives marked [dual]. In a dependency approach, provided there is a mechanism for feature spreading, the same result will follow, and it makes little difference whether the adjective or noun is head of the phrase dependent on the numeral (except that if the adjective is head, the irregular feature must be 'passed on' by the adjective, on which it has no effect).

How then are we to explain the occurrence of the genitive plural in phrases like *dve interesnyx knigi* 'two interesting books'? We can hardly claim this is government by the numeral since that would involve it imposing the features [dual] and [genitive plural]. The appearance of the genitive becomes much clearer if we look at the numeral system as a whole. With numerals like *pjat'* 'five', we always find the genitive plural of the quantified phrase, provided the numeral is in one of the direct cases. With *tysjača* 'thousand' the same holds, and the genitive may be found when the numeral is in an oblique case. Table 3 summarizes the position for each of the simple cardinal numerals.

Table 3: Use of the genitive plural with the simple cardinal numerals of Russian

	odin	dva, tri, četyre, pjat'	sto	tysjača	million	
	1	2-4	5	100	1,000	1,000,000
direct cases	no	no/yes	yes	yes	yes	yes
oblique cases	no	no	no	no	no/yes	yes

It can be seen that as the numeral becomes higher, so the likelihood of the genitive plural being used increases; at the same time it is more likely in the direct cases than in the oblique. There are two points at which an option occurs. The first is with the oblique cases of *tysjača* 'thousand', where we find both *o tysjače* (locative) *rublej* (genitive plural) 'concerning a

thousand roubles' and *o tysjače* (locative) *rubljax* (locative plural). The second is with *dva* and similar numerals, where the genitive plural is not shown on the noun, which has an exceptional marker, but may be shown on the adjective. In an earlier framework, I proposed a rule of 'genitive insertion' to add a genitive case marker in the appropriate circumstances (Corbett 1978a:360-1). These 'appropriate circumstances' vary idiosyncratically within and between languages, thus Danish permits *et glas vand* 'a glass water' while English requires 'of water'. They are not restricted to quantified expressions: English permits *the River Thames*, but not *\*the town Guildford*. The contrast between direct and oblique cases in Russian has a functional explanation based on the greater syntactic prominence of the direct cases; since these indicate the main arguments of the verb, non-head elements which would otherwise bear one of these cases are marked with the genitive.

The other clear point already noted from Table 3 is that as the numerals get larger, so the genitive of the dependent phrase becomes more likely. This is an exact reflection of the fact that the numerals become more noun-like as they become larger - as other aspects of their syntax show. Given the limited noun-like qualities of *dva*, *tri* and *četyre*, the use of the genitive plural adjective is optional. The importance of this for our discussion is that it is not an idiosyncratic fact about these three numerals that they may take, but do not require, a genitive plural adjective; rather it is a consequence of their lying between *odin* 'one' for which the genitive is excluded and *pjat'* for which it is obligatory in the direct cases. The imposition of the genitive is thus rather different from the irregular government of the genitive singular of the noun. I suggest that these numerals optionally take the genitive, simply as a consequence of being numerals (given their place on the numerical scale). However we view the relation between noun and adjective in the quantified expression, it will be necessary for the genitive feature to appear on the noun (or on a node dominating it) for reasons we shall come to later. But it will have no effect on the noun, since the irregular feature [dual] will be interpreted in the morphology to give the genitive singular.

Two objections need to be considered. The first is that the [dual] and the [genitive] features present a conflict. This is not so,

since [genitive] is a value of the category case, while [dual] is an irregular marker, to be interpreted in the morphological component as a unique form for some nouns (like *čas* 'hour') or as the regular genitive singular (occasionally nominative plural) for others. It appears therefore that we do not here require the rules for resolving case conflicts suggested by Zwicky (1986:99-102). The second objection is that the marking of the genitive on the quantified phrase represents an overwriting of features, which is something we should avoid for general theoretical reasons (Corbett 1981:74). Although we have considered the nominative to be what we would expect to appear, not needing explanation, the fact that it appears when the genitive is not imposed results from a Feature Specification Default (Gazdar, Klein, Pullum and Sag 1985:29-31). Other things being equal, the nominative is used in Russian, as shown, for example, by the fact that it is used as the citation form. Thus the imposition of the genitive does not overwrite a nominative value of the category case, but if the genitive is not imposed then the nominative will appear by default.

Having established how it is that the adjective can stand in the nominative or genitive plural with the numerals *dva*, *tri* and *čet'yre* we should now consider the factors which influence the choice. As already mentioned, these are quite numerous and complex. What is important for our consideration of the head-dependent relation is that we can establish clearly a major factor where the numeral is the determining influence and another which is controlled by the noun.

It will be simpler for exposition purposes if we start from the major factor originating with the noun, which is its gender. It is well established that the adjective is more likely to stand in the genitive if the noun is masculine or neuter than if it is feminine. This is confirmed by the data presented in Table 4.

Table 4: Use of the genitive plural with 2-4 in Russian: effect of gender. (Total number of examples in parentheses.)

	masculine	feminine	neuter
Suprun (1957:73)	85% (132)	31% (87)	94% (17)
Corbett	100% (214)	27% (161)	93% (40)

Suprun extracted his examples from literary texts - mainly modern - but he includes various word-orders (43 examples are not of the type numeral-adjective-noun). My examples are from prose (novels, short stories and non-fiction) of the period 1970-80.<sup>17</sup> The difference between the two sets of figures stems largely from Suprun's inclusion of examples with word-orders where the nominative is favoured. We can see that if we look strictly at the position between numeral and noun, then the modern norm is for the genitive with masculine and neuter nouns,<sup>18</sup> with both cases possible for the feminine.

The position is indeed curious: the case of the attributive adjective depends in part on the gender of the noun. Moreover, this influence is operating on the plural form of the adjective which, as already mentioned, does not differentiate gender. The reason behind the difference according to gender is clear, in that many feminine nouns have identical forms in the genitive singular and nominative plural, so the retention of the nominative plural adjective is understandable. It is rather less clear how this is reflected in a grammar. At first sight it seems that - speaking loosely - the features should be 'gathered' on the adjective and the potential conflict of features originating with the numeral (case) and with the noun (gender) should be resolved there. But as we shall see in the next section, where we add a further element to the construction, this approach is inadequate. However, we have already seen that the numeral must be marked for gender, to account for the choice of *dva* (masculine/neuter) versus *dve* (feminine). Since the numeral is marked in this way (and so, we shall have to assume are *tri* and *čet'yre*, though there is no external indication here), then this gender marking will influence whether or not the genitive case feature is imposed on the phrase dependent on the numeral. Unfortunately, this does not help us any further with the head-dependent relations. The gender

<sup>17</sup> Where more than one adjective was found in a given example, I counted each separately, since occasionally the two different cases are found together (see *lordanskij* 1958:71 for two examples involving *oba* 'both'). However, in my sample, case was consistent in the position under discussion.

<sup>18</sup> The nominatives with neuter gender in my corpus are all unusual: *vse tri èti Bož'i sozdanija* (Maksimov, *Karantin*); *po tri prekrasno prorisovannye polukruž'ja dekorativnyx zakomar, ispolnennye v krupnom rel'efe* (Tel'tevskij, *Drevnie goroda Podmoskov'ja*).

feature can be 'passed up' to the head numeral direct from the noun (if that is head), through an intervening node (in a constituency approach) or through the adjective, if the adjective is head.

The factor which most obviously depends on the numeral in the choice of case for the adjective is the actual numeral itself. While what we have said so far is true of all three numerals, apart from the agreement in gender of *dva/dve*, the choice of case for the adjective varies according to the numeral, as was pointed out by Gallis (1947). The evidence is taken from rather small sets of examples, which is not too surprising since examples occur only about once in 5,000 words of running text. Nevertheless the picture which emerges is clear, as Table 5 shows.

Table 5: Use of the genitive plural with 2-4 in Russian: effect of the numeral. (Total number of examples in parentheses.)

	<i>dva/dve</i> 'two'	<i>tri</i> 'three'	<i>četyre</i> 'four'
Gallis (1947:70)	56% (64)	66% (30)	85% (13)
Worth (1959:123)			
(feminine only)	28% (29)	50% (6)	66% (3)
Suprun (1957:77)	63% (147)	68% (73)	81% (16)
(feminine only)	18% (55)	48% (27)	80% (5)
Corbett	71% (293)	72% (82)	70% (40)
(feminine only)	22% (109)	38% (32)	40% (20)

These data are not fully comparable. Gallis' examples come from rather disparate sources and include some with *oba* 'both' (under *dva*). Worth used only twentieth century prose, and given the considerable influence of gender, gives data just for the feminine gender, where the choice of case is most open. Suprun's corpus and mine are as for Table 4. There are some problems with the data in terms of sample size, and the uncertainty as to other interfering factors since other example types were included in some cases. And when we look at my data, taken from the largest corpus and including only examples of the type numeral-adjective-noun, then there seems to be no observable effect. This is because of the different numbers of examples with the different numerals; if we look just at those where the noun is of feminine gender, then the picture is clear: the genitive

is more likely to be found with *tri* 'three' than with *dva/dve* 'two', and more likely with *četyre* 'four' than with *tri* 'three'. In one respect the data fit beautifully with our analysis. If we look back to Table 3, we see that the likelihood of the genitive being found in numeral phrases increases monotonically as the numerals become larger. Instead of *dva*, *tri* and *četyre* being lumped together, each fits independently at its rightful place (this ranking gains support from predicate agreement, Corbett 1983:221). On the other hand, in most current theories the place where the difference between the options must be coded is in the lexical entries of the numerals, and it is not obvious how this regularity can be captured there. Nevertheless, in terms of our main concern, it appears that the major factors which determine the case of the adjective are found on the numeral, either coming from its lexical entry or by agreement from the noun.

Let us return to the two questions we asked when adding in the adjective to the construction we are analysing. On the first, which was whether these phrases suggest that the head properties are shared between numeral and noun or whether they indicate that the numeral is the clear head, we must answer that, though the data are complex, there is nothing which prevents us maintaining the analysis which has the numeral as the head in relation to the quantified nominal phrase. And second, within that nominal phrase, there is, unfortunately no evidence from the choice of form of the adjective which forces us to adopt a particular head-dependent structure for phrases consisting of adjective plus noun.

### 3. Worth's riddle

We can continue our investigation by further complicating the phrases we are analysing. Indeed, a major test for any analysis of Russian numeral expressions is whether it can handle 'Worth's riddle' (Worth 1959:124; Corbett 1978c), for which we add a fourth element to our phrase, namely a post-nominal adjectival phrase. First we look at phrases with a post-nominal adjectival phrase and no pre-nominal modifier:

- (1) *dve puški, otlitye v 1590 g.*  
 (Ivanov, *Moskovskij Kreml'*)  
 two cannon, cast.NOM in 1590

'two cannon, cast in 1590'

I take it that in everyone's account, phrases such as *otlitye v 1590 g.* 'cast in 1590' are dependents and not heads. They are optional elements, marked off intonationally. Certainly the majority of the criteria indicate that they are dependents (we return in a moment to what they depend on). The fact that they must be analysed differently from normal pre-nominal adjectives makes the case for treating the adjective as the head of its noun appear rather less strong. Let us accept, however, that the post-nominal adjectival phrase is a dependent and see what light such phrases can throw on the rest of the numeral phrase. The adjective, or participle, heading such phrases can stand in the nominative, as in (1), or in the genitive:<sup>19</sup>

- (2) dva trona, soedinennyx meždu soboj  
(Aleksandrov, *Po Kremlju i kratkij putevoditel'*)  
two thrones, connected.GEN between selves  
'two thrones, joined together'

Given that an adjective within the numeral phrase can stand in the nominative or in the genitive, and that the adjective heading a post-nominal adjectival phrase can also stand in either case, if we have both present then logically we should expect four possibilities:<sup>20</sup>

A.	2-4	ADJ (NOM)	NOUN	ADJ (NOM)
B.	2-4	ADJ (GEN)	NOUN	ADJ (NOM)
*C.	2-4	ADJ (NOM)	NOUN	ADJ (GEN)
D.	2-4	ADJ (GEN)	NOUN	ADJ (GEN)

It was Worth (1959:124) who noted that C does not occur.<sup>21</sup> Type A is relatively easy:

<sup>19</sup> In the corpus already described, there were 26 examples with the nominative case, comparable to (1), and 8 examples with the genitive, comparable to (2). Thus the nominative is much more likely in post-nominal position (76% of the examples); in pre-nominal position it was found in 120 examples out of 415 (29%).

<sup>20</sup> Note that ADJ covers participles as well as ordinary adjectives.

<sup>21</sup> The relative frequencies in my corpus were: A (NOM - NOM) 4 examples; B (GEN - NOM) 16 examples; C (NOM - GEN) no examples; D (GEN - GEN) 9 examples.

- (3) dve belye rozy, utonuvšie v krasnoj luže  
(Bulgakov, *Master i Margarita*)  
two white.NOM roses drowned.NOM in red pool  
'two white roses, drowned in the red pool'

Here the quantified phrase has not gained a genitive case feature, as the pre-nominal adjective shows, and so there is no source for a genitive case for the participle *utonuvšie* 'drowned'. Examples of type D, with two genitives, are also relatively easy:

- (4) dva bolšix kuska stekla, obernutyx v trjapku  
(Trifonov, *Starik*)  
two large.GEN pieces of.glass wrapped.GEN in .rag  
'two large pieces of glass, wrapped in a rag'

Here the genitive has been imposed on the quantified phrase, and the participle gains this feature from its head, the noun (even though the noun does not itself show the feature being marked [dual] in any case. This will be possible whether the head of the quantified phrase is the (pre-nominal) adjective or the noun. The mixed case type B is more difficult:

- (5) tri latvijskix mužika, počti pozabyvšie  
three Latvian.GEN peasants almost having.forgotten.NOM  
rodinu  
homeland  
(Trifonov, *Starik*)  
'three Latvian peasants, who had almost forgotten their  
homeland'

Here the genitive has been imposed on the quantified phrase, as the adjective *latvijskix* shows; how then can *pozabyvšie* stand in the nominative? It is attached at a higher level of structure, if we use a constituency framework; in terms of dependency, it depends directly on the head of the phrase, *tri*, and so is nominative. These two possible types of attachment/dependency for post-nominal adjectival (and participial) phrases is not an ad hoc device, since they are found with other numeral phrases where there is no other source of variation:

(6) pjat' čelovek, postroennye v kolonnu (Vojnovič)<sup>22</sup>  
 five men formed.NOM in column  
 'five men, formed up into a column'

(7) dvenadcat' literatorov, sobravšixsja na zasedanie  
 twelve writers gathered.GEN for meeting  
 (Bulgakov, *Master i Margarita*)  
 'twelve writers, gathered assembled for a meeting'

These examples show that, using dependency terms, post-nominal adjectival phrases may depend directly on the numeral, as in (6), in which case the adjective or participle stands in the nominative. Alternatively, they may depend on the noun, as in (7), in which case the adjective/participle will be in the genitive.<sup>23</sup> With numerals above *četyre* 'four', marking of the noun as genitive is obligatory (see Table 3), and so there is no further option here.

This analysis implies that examples like (1) and (3) above are structurally ambiguous: the adjective is in the nominative, the numeral is 2, 3 or 4, and there is no evidence that the genitive has been imposed by the numeral: if it has not been, then the adjectival phrase may depend on the numeral or on the noun and in either case the nominative results.

We can now explain why type C constructions do not occur:

(8) \*dve belye rozy, utonuvšix v krasnoj luže  
 two white.NOM roses drowned.GEN in red pool  
 'two white roses, drowned in the red pool'

The form of *belye* 'white' shows that the genitive has not been imposed on the nominal phrase;<sup>24</sup> thus there is no source for

<sup>22</sup> The relative frequencies in my corpus were: A (NOM - NOM) 4 examples; B (GEN - NOM) 16 examples; C (NOM - GEN) no examples; D (GEN - GEN) 9 examples.

<sup>23</sup> It is claimed that in some instances at least there is a clear semantic difference between the two (see Iomdin 1979:37; Mel'čuk 1985:448-9). In some cases the nominative case implies definiteness and the genitive indefiniteness. A. E. Kibrik suggests (personal communication) that the same distinction applies to pronominal adjectives too, when the two case forms are available (that is, with feminine nouns).

genitive marking on *utonuvšix* 'drowned': whether this participle depends on the numeral or on the noun it will acquire nominative case marking.

It appears therefore that if the numeral is taken as the head, and the quantified phrase as the dependent, our analysis permits an explanation of Worth's riddle. However, the explanation is available whether we take the adjective to be head of the noun, within the quantified phrase, or the noun to be head of the adjective.

### Conclusion

We have presented an analysis of the most difficult of the numeral phrases in Russian, including an account of Worth's riddle. This required: first, the use of an irregular feature (which we called [dual]), needed on morphological grounds; second, the claim that the case feature specification default for Russian is nominative (which is amply justified by other evidence); third, the genitive rule (which can also be seen as a type of default in that nominal phrases dependent on other nominal phrases typically take the genitive in Russian); fourth, feature percolation 'up and down', since gender is a lexical property of nouns, but is realised on the numeral by agreement, while conversely the numerals investigated govern the form of the noun (by imposing the [dual] feature); and sixth, two forms of attachment/dependency for adjectival phrases (again something required independently).

However, the main purpose of the analysis was to see what light it could shed on headedness relations. We noted that the criteria adopted in the Zwicky-Hudson debate proved difficult to apply in some instances as the list of constructions investigated was extended. In particular, looking at a language with a rich morphological system means that it becomes crucial whether or not morphology can be disregarded in applying certain criteria.

If our main aim is to find an analysis in which the headedness relations are simple and consistent, then Hudson's interpretation

<sup>24</sup> It is the ungrammaticality of examples like (8) which show that the features cannot be gathered on the adjective and any conflict resolved there. If this procedure were adopted we could not prevent differing results on the two adjectives, which is required for examples like (5) but must be ruled out for those like (8).

of the criteria at first sight yields a more elegant analysis. In this approach, the numeral has to be taken as the head in Russian constructions consisting of numeral plus nominal phrase, and this allows us to treat all such numeral constructions alike in terms of headedness. We must, however, recognise that headedness is a gradient notion, since case affects the degree to which the head shows head-like properties. When we looked more closely at the relations within a nominal phrase consisting of adjective plus noun the picture became less clear. Our analysis would work with either element as head. If, however, we wish to maintain simplicity and consistency in our assignment of the head relation, then we are forced to claim that the adjective is the head of adjective-noun constructions in Russian. Such an analysis has already been proposed by Miller, but some might consider this step counter-intuitive and too high a price to pay for an elegant analysis.

Taking a more general view, it is surprising that such apparently simple matters as the relations of the basic elements within the noun phrase are open to debate and that the criteria for deciding the issue are far from settled. It is also worth noting that the approach adopted seemed to push us towards a dependency analysis, as giving the simpler account. And yet, while we have seen that there is room for genuine debate about the internal headedness relations of Russian quantified expressions, there seems little doubt that they form constituents. Thus these constructions could be taken as evidence favouring constituency-based rather than dependency-based analyses.<sup>25</sup> However, that debate has moved on, in that those arguing for constituency-based analyses increasingly treat the head-dependent relation within constituents as crucial (as in Gazdar, Klein, Pullum and Sag 1985:50-2 and in Kornai and Pullum 1990). This means in turn that it is important to continue undertaking detailed analyses of constructions where the head-dependent relations are not clear, and so to sharpen the criteria available for determining which element is the head.

<sup>25</sup> Compare Hudson (1980a, b) and Dahl (1980).

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## EUROTYPE

### THEME 7: NOUN PHRASE STRUCTURE

#### WORKING PAPERS

1. Frans Plank, *Suffix Copying as a Mirror-image Phenomenon*.  
(February 1990)
2. Frans Plank, *On the Selective Elaboration of Nominal or Pronominal Inflection*.  
(May 1990)
3. Geville G. Corbett, *Gender and Gender Systems*.  
(June 1990)
4. Edith A. Moravcsik, *Descriptors of Noun-Phrase-Internal Structure*.  
(August 1990)
5. Geville G. Corbett, *Agreement: An Overview*.  
(September 1990)
6. Frans Plank, *Review of Agreement in Natural Language*, ed. by Michael Barlow & Charles A. Ferguson.  
Stanford: CSLI, 1988.  
(October 1990)
7. Maria Kopčevskaja-Tamm, *Action Nominal Constructions in the European Languages*.  
(November 1990)
8. Jim Hurford, *An Inventory of Noun Phrase Universals: Format and Specimen List*.  
(November 1990)