Theoretical Implications of Slavic Agreement

Tatjana Scheffler

May 11, 2004

1 Introduction

In this paper I set out to find the nature of AGREE, the machinery that accomplishes morphological agreement. The nature hasn't been found, but I examine some cases of agreement mismatches mainly from Slavic languages, to see what they tell us about the necessary machinery.

I discuss three different approaches to account for mismatches, and compare them to each other. The finding will be that in the absence of a clear idea what AGREE can and cannot do, evaluation of the accounts is very complicated.

However, it will become clear that there are at least two different types of agreement, which follow different rules. Furthermore, the observed mismatches suggest that there is more structure than commonly assumed to the agreement features of gender and number, and that maybe the two agreement processes handle different, but related feature sets. A big number of open questions remains.

2 Agreement Mismatches

(Halle, 1994) describes mismatches of morphological agreement within noun phrases, especially numeral phrases in Hebrew and Russian. He proposes an account for the mismatches which makes use of both Redundancy rules and feature-changing rules (he calls them Switch Rules).

2.1 Hebrew number/gender endings

Nouns and adjectives in Hebrew have a suffix that expresses a number/gender complex. The basic endings are:

	Sg	Pl
F	-A	-ot
M	-∅	-im

Adjectives don't have an intrinsic gender or number, they agree with their head noun in both categories. To accomplish this, an abstract process (which Halle calls *Concord*) is assumed. It is however left completely open how this

process works. Somehow, the gender and number features of the noun get copied onto the adjective.

In the framework of Distributed Morphology, Late Insertion is assumed. This means that although the syntax operates on pieces only, not all of these pieces have phonological content. Some are abstract morphemes. These functional morphemes will get inserted *late* in the derivation, after some morphological processes have taken place. Thus, for example, the features that have been introduced by Concord or by Redundancy rules will be subject to Vocabulary Insertion.

So, for example, the following are valid noun phrases in Hebrew after Vocabulary Insertion:

(1)   par-A Tov-A (good cow$_{sg}$)

(2)   sus-im Tov-im (good horses$_{pl}$)

Gender Mismatches.   For some classes of words, however, the ending does not reflect their gender. Instead, they take the ending of the opposite gender (but not number) in either both singular and plural, or just one of the numbers.

These nouns however take adjectives with the "correct" ending, that reflect the noun's underlying gender.

To account for this mismatch, Halle introduces a "Gender Switch Rule", a feature-changing rule that switches the gender of certain nouns *after* Concord has taken place. This Gender Switch Rule makes reference to a list of roots to which this rule applies. There must be an ordering of rules, because switching the gender before Concord would lead to the adjectives showing the same ending as the head noun, but that is not the case.

(3)   nEhar$_M$-ot$_F$ Tov-im$_M$ (good rivers)

(4)   šan$_F$-im$_M$ Tov-ot$_F$ (good years)

The necessary ordering of rules is

1. Concord

2. Gender Switch

3. Vocabulary Insertion

Comparison.   The effect described here is essentially the same kind of mismatch that (Harris, 1991) describes about gender exponents in Spanish.

He takes a completely different approach, which does not make such crucial use of feature-changing rules, but instead tries to use redundancy rules that are blocked by certain other features. For him, there is no [−Fem] feature, just a mono-valued [F] feature that can be present or not. Redundancy rules specify that feminine nouns have the ending -a, and that nouns with no feminine feature have the ending -o. Furthermore, some idiosyncratic features can determine

endings, and thus block the application of the redundancy rules: E.g., nouns can be prespecified to have a -a or -∅ ending.

As Harris notes, his account bases crucially on the fact that the exact opposite of the default marking, namely -o for feminine (and -a for the masculine, if it is a noun that can appear in both genders) does never show up systematically in the grammar.[1]

It is quite obvious why that analysis could not be carried over to the Hebrew case, although it is more appealing than the "brute force" Gender-Switch rule. In Hebrew, although much more feminine nouns have masculine endings than the other way around, both kinds of mismatches are possible. Thus, it is not clear what a redundancy rule should do, because the paradigm space could not be simplified by using features as in (Harris, 1991).

Of course, if we introduced enough idiosyncretic features, the account could still be made to work. One feature both for the -A/-ot endings and for the -∅/-im endings would do the trick. This would amount to introducing two declension classes: I (-A/-ot) and II (-∅/-im). These declension classes would then exist independently of the gender of the nouns, which is another intrinsic feature. Redundancy rules could specify that a feminine noun usually belongs to class I, a masculine noun to class II:

(5)   **Redundancy rules for Hebrew declension class.**
      $[+\text{Fem}] \rightarrow \text{I}$
      $[-\text{Fem}] \rightarrow \text{II}$

The Vocabulary Items must then be changed to refer to only the declension class, not the underlying gender, because there can be mismatches.

Specifying a feminine root for declension class II or a masculine root for declension class I would block the redundancy rules from applying, yielding the correct result for Vocabulary Insertion. As declension class is not a Concord feature, it never gets copied onto adjectives or other modifiers. They just agree with the gender of the noun, yielding the correct results (as adjectives never show a declension class/gender mismatch in Hewbrew).

Nouns like ?erec-∅/?arac-ot (F, land) may seem like a problem, because it shows the expected feminine ending in the plural, but the masculine ending in the singular. There could of course be a special rule introducing the declension class feature for just one of the numbers for certain sets of nouns, which would have to be ordered before the Gender redundancy rules. Or alternatively, we can split the declension classes into 4 classes, with all possible combinations. The nouns in question would then have to be prespecified for their declension class.

Of course, all these solutions are not much prettier than the one proposed by (Halle, 1994). However, it seems to happen often that some nouns belong to one declension class in the singular, and another one in the plural. For example,

---

[1] Supposedly there are a handful of feminine nouns ending in -o, which may easily be ignored as exceptions.

some languages have only one class for the plural at all. Thus, this kind of machinery is needed anyway.

Conclusion (Halle, 1994) for Hebrew and (Harris, 1991) for Spanish account for the same kinds of mismatches in different ways: Harris by introducing more idiosyncratic features and using redundancy rules, Halle by using feature-changing rules. The Hebrew data shows that Harris' approach is not very appealing for more complex data, because the simplification of the feature space does not work any more. Of course, through the introduction of enough idiosyncratic features we can account for all kinds of data, but this will introduce a lot of redundancy into the grammar.

Halle's approach uses feature-changing rules, which are very powerful. He also makes use of highly specified contexts in these rules, which may be a formal problem, if one looks at it closely. However, as gender is not interpreted by the semantics, feature-changing seems in principle possible as a tool, because these features are just used to guide the morphological processes, and for Vocabulary Insertion.

2.2   Russian Numeral Phrases

Russian numeral phrases are a famous case of agreement mismatch. For Halle, Concord within the noun phrase also copies case features on all dependent elements. That is, noun phrase internal concord comprises gender, number, case, and also animacy. The first thing that Halle notes is a kind of case idiosyncrasy: In Russian, there is no special ending for the Accusative for masculine nouns (of declension II) or plural nouns. Instead, animate nouns show the appropriate Genitive case ending, whereas inanimates show an ending that is the same as in the Nominative.

Halle accounts for this by introducing a Case Switch rule, which changes the case feature on the noun and on adjectives to Nominative or Genitive depending on animacy.

The same data could be accounted for, as Halle notes, by modifying the Vocabulary Insertion rules. His arguments against that are not actually valid. If you can specify discjunctive contexts in only one Rule, as in the Case Switch rule he gives on page 202, of course the same ending can also be introduced in a context that is discjunctively specified as [nom] $\vee$ [acc,$-$anim].

An argument for this could be made, because morphological case is sometimes semantically interpreted. For example, adjuncts that express temporal duration stand in accusative, and the fact that they are accusative shows that they are adjuncts of duration (and don't, for example, express a time point).

(6) *Ja   rabotala   ves'   d'en'.*
     I   worked$_F$ whole$_{M,nom/acc}$ day$_{M,nom/acc}$.
     I worked the whole day.

(7) *Ja   rabotala   vsju   nedelju.*
     I   worked$_F$ whole$_{F,acc}$ week$_{F,acc}$.

I worked the whole week.

If the feature is actually interpreted, and it is switched during the morphological derivation, the question when the interpretation happens comes up. This is an additional complication that does not have to be addressed if we only use redundancy rules.

The Case Switch rule would have to be used after Concord as well (as above in Hebrew), because the case of adjectives also switches. This rule differs from the Hebrew Gender rule in that it doesn't reference specific lexical items, but applies to all nouns or adjectives that have the correct feature bundle.

Animacy as a subgender. There is another way to think about the animacy distinction, mentioned in (Wechsler and Zlatić, 2003) for Serbian/Croatian. In Slavic languages like Russian or Serbian/Croatian, animacy really is a subgender of masculine. That is, only masculine nouns are ever distinguished for animacy.

In an approach to the morphological feature space that structures the possible features (see Harley and Ritter, 2002), this would have to be captured by making the animacy feature dependent on the masculine feature.[2]

Numerals. The data for Russian numerals is quite complicated. The basic facts, that Halle accounts for, are that in oblique cases, the numeral, adjectives and the head noun all agree in case and gender. The noun also appears in plural. In direct cases, the paucals (2-4) assign Genitive singular on the noun and modifiers, while the higher numbers (5+) assign Genitive plural.

Halle says that the numeral is in all cases a head that takes the noun phrase as its complement. In direct cases, he claims that Concord fails to apply, and therefore Genitive is introduced as a default. This makes more sense for the higher numbers, which are feminine singular nouns, than for the paucals, which are essentially adjectives and should therefore agree with the head noun they modify. It is not explained why it should be possible that an adjective heads a noun phrase. Evidence for agreement from the noun onto the numeral is the plural number in which the numbers 2-4 appear. This is, as Halle notes, triggered by the plural number on the head noun.

In summary, the numeral phrases exhibit a weird kind of agreement which goes both ways. In oblique cases the numeral just agrees with the whole noun phrase. In direct cases the case of the noun phrase is determined by the numeral, but the numeral's number and gender (at least for paucals) is determined by the noun:

(8) *dva*   *brata*
     two$_M$ brothers$_{M,Gen,sg}$

---

[2]Of course, this dependency only holds for Russian. This opens the question whether it is really possible to find one feature hierarchy like the tree proposed in (Harley and Ritter, 2002) which will be valid for all languages, and from which the languages just pick a subtree of actual distinctions.

(9) *dve   sestry*
     two$_F$ sisters$_{F,Gen,sg}$

Halle accounts for the singular that is triggered by the paucals by a Number Switch rule which changes singular into plural after paucals. This rule only applies to the nouns, the adjectives stay in plural. It has to be ordered after Concord.

This same effect should be possible to account for by introducing an underlying paucal for Russian, in addition to a singular and plural, which would only be triggered by overt quantification. It so happens that the paucal is syncretic with the singular in nouns, and the plural in adjectives.

In the case of feminine head nouns, a further complication is the fact that adjectives may alternatively appear in nominative plural instead of genitive singular:

(10) *Ja   verju,   čto   pridёt   den',   kogda   dve$_{nom}$ naši$_{nom.pl}$*
      I   believe, that   arrives day,   when   two   our

      velikie$_{nom.pl}$ strany$_{gen.sg}$ budut   doverjat'   drug   drugu.
      great   countries   will   trust   each   other.

      I believe that the day will come, when our two great countries will trust each other.

Some speakers even judge the nominative grammatical for some masculine or neuter noun modifiers:

(11) *Pri   ètom   zabyvajutsja   dva$_{nom}$ važnye$_{nom.pl}$ obstojatel'stva$_{gen.sg}$.*
      By   this   are-forgotten   two   important   circumstances.

      Thereby, two important circumstances are forgotten.

Another feature-changing rule is introduced, a Case Switching rule which applies optionally to feminine (or possibly also non-feminine) adjectives after paucals.

I would suggest that what in fact happens, is that the adjective instead of agreeing with the noun, agrees with the numeral to its left. It is not quite clear at this point how Concord works, except that features are copied from one word in the noun phrase onto another. Usually this process could be expected to work inside-out, starting from the noun, which provides all the features. However, case features must work differently, because they are not inherently specified in the noun. Instead, they come from the verb or some other governor which specifies what morphological case the argument should have.

In the numeral phrases in particular, we see that case is governed by the numeral, even if the numeral is (claimed to be) an adjective morphologically. Thus, it could be that case agreement/government proceeds outside-in in the case of numeral phrases, and that the numeral only determines the case of the head noun by government. Then, as the phrase is in some sense doubly headed,

Concord has an option of copying features from the numeral or from the noun onto intervening adjectives[3]

3 Serbian/Croatian Agreement

In Serbian/Croatian, many mismatches between declension class, gender, and sex can be found. Wechsler and Zlatić (2003) describe some mismatches and provide an account in the HPSG framework. That account makes crucial use of two different sets of agreement features (CONCORD and INDEX), which are linked by redundancy rules.[4] Redundancy rules also specify that CONCORD should reflect the morphological form of the word (i.e., the declension class), and INDEX the semantics, if possible (that is, gender should reflect sex, grammatical number real-world number, etc.). In the following I will look at the data and examine whether the two separate sets of features are in fact necessary, even under a Distributed Morphology analysis, or whether the machinery enables us to do with only one set of features.

3.1 deca-type nouns

There is a (relatively small) class of nouns in Serbian/Croatian, which shows mixed agreement. One example is "deca" (children), which is the plural of "dete", a neuter singular noun meaning "child". Plural nouns of this type trigger feminine singular agreement on targets in the noun phrase, but neuter plural on the verb (or auxiliary clitic).[5]

(12) *Ta*　　　　*dobra*　　　*deca*　　　　　*su*　　*došla.*
　　　 That$_{Fsg/Npl}$　good$_{Fsg/Npl}$　children$_{Fsg/Npl}$　AUX$_{3pl}$　come$_{Npl}$.
　　　 Those good children came.

(13) *Ta*　　　　*dobra*　　　*deca*　　　　　*dolaze.*
　　　 That$_{Fsg/Npl}$　good$_{Fsg/Npl}$　children$_{Fsg/Npl}$　come$_{3pl}$.
　　　 Those good children came.

(14) *Posmatrali*　*smo*　　*ovu*　　*dobru*　　*decu.*
　　　 watch$_{1pl}$　　AUX$_{1pl}$　this$_{Fsg}$　good$_{Fsg}$　children$_{Fsg}$.
　　　 We watched these good children.

---

[3] Although presumably there is no mixing. Thus, once it has started, Concord doesn't stop and start from the other side.

[4] CONCORD contains the features gender, number, and case; whereas INDEX contains the features gender, number, and person. Thus, the two sets are not exactly the same. They overlap in gender and number, which are the main features of agreement that will be of interest here.

[5] The following examples (as all the Serbian/Croatian data in this paper) is taken from (Wechsler and Zlatić, 2003). I changed the glosses when I found that appropriate to avoid confusion or to be more accurate (the glosses in the book are often used to smooth over complicated points).

The examples (12-13) show that the noun triggers neuter plural agreement on the verb, and on the auxiliary clitic. The determiner and adjective agree with the noun as well, but the data is ambiguous: For determiners and adjectives, the nominative of the feminine singular and the neuter plural are syncretised. Example (14) disambiguates between the two possibilities: the accusative is unambiguously feminine singular. I have also glossed the children as feminine singular, although it is exactly the question what features this noun has.

Another complication is introduced by secondary predicates. These predicates can only be in feminine singular, neuter plural is not allowed.

(15) *Ja   smatram   decu   gladnom   /   *gladnim.*
      I   consider   children hungry$_{Fsg}$ /   hungry$_{Npl}$.
      I consider the children hungry.

This is a complication because the agreement within the noun phrase is relatively local, but secondary predication is very non-local, at least at first sight. Thus, how do these two types of agreement come about?

CONCORD **vs.** INDEX. Following the proposed HPSG analysis, a root could contain more than one intrinsic feature that refers to gender or number. Vocabulary Insertion does not care about the gender feature, because it just refers to declension class. Nouns of different genders in the same declension class still get the same ending. A redundancy rule specifies the relationship between declension class and gender. In Serbian/Croatian, one of these rules could be

(16) **Redundancy rule for S/C declension class II.**
     II → [+Fem]

A noun can have idiosyncratic gender marking, if it does not conform to this default. An example are some male-denoting masculine nouns in declension class II, like "komšija" (colleague), which trigger masculine agreement.

(17) *Moj   komšija   je   došao.*
      My$_{Msg}$ colleague$_{[-Fem]}$ AUX$_{3sg}$ came$_{Msg}$.
      My neighbor came.

The marking blocks the application of the redundancy rule.

Nouns furthermore have gender features that reflect their verb-agreement behaviour. These features are different from the NP concord features (let's call the gender and number we had before GENDER and NUMBER, and the new features IND(EX)-GENDER and IND-NUMBER), but they are also linked by a redundancy rule:

(18) **Concord-Agreement Redundancy Rules**
     [α Fem] → [α Ind-Fem]
     [α Pl] → [α Ind-Pl]
     . . .

Then, it can be assumed that the Concord process for noun phrases and secondary predication copies the gender and number features, whereas the Agreement process that triggers subject-verb agreement is different, and it addresses ind-gender and ind-number features. This idea is not so far-fetched, because we already know that the two processes copy different kinds of agreement, namely Concord copies case as well, whereas Agree copies person.

To account for the deca-type nouns under this analysis, only one further ingredient is needed: a rule that changes [nt,pl] in the context of deca-type nouns to [II;ind-nt,ind-pl].

(19) **Feature Switch rule for deca-type nouns.**

[nt,pl] $\rightarrow$ [II,sg;ind-nt,ind-pl] / ____ {dete, brat, gospodin, ... }

The difference of this rule to the rules assumed by Halle, for example, is that it must apply *before* all other rules. It is basically a *lexical* rule, that provides the correct representation on the tree, which then undergoes morphological processes. Redundancy rules apply after this rule, so that [II] gets spelled out as [+Fem]. Concord also applies only after the rule has switched the representation, because concord refers to the gender feature, and that should be feminine.

Another approach. It could also be attempted to account for the data along the lines of (Halle, 1994). The noun "deca" should then be underlyingly neuter plural, because that would be the most straightforward representation that we obtain from the syntax. Concord/Agree copies these features throughout the tree onto relevant other words.

Then, a Feature Switch rule would be needed that changes the features of words within the noun phrase to [fem,sg].

(20) **deca-type noun Feature Switch.**

[nt,pl] $\rightarrow$ [fem,sg] / $_{NP}$[... [____] ... $_N$[X]]
where X = 'dete', 'brat', 'gospodin', ...

This rule is a little bit problematic because it makes reference to the complete structure of the phrase. The context really needs to specify a noun phrase headed by the root "dete", etc. This is not easily expressed in string terms.

The bigger problem is the agreement on the secondary predicate. The secondary predicate is not local to the head noun in the same way as the nouns direct modifiers are. If we assume a transformational approach, the head noun is probably adjacent to the secondary predicate at some point, because the noun phrase is the argument of the predicate, and gets moved out of there. A trace is left. However, the trace does not tell us directly what type of noun it comes from. A feature-switching rule that accounts for secondary predicates would have to specify a context where there is a dependent trace, which is coindexed with a noun of the deca-type. This presupposes a very powerful mechanism

for the rules, probably much more powerful than one would want to allow in general.[6]

Alternatively, Concord could apply cyclically after each of the relevant steps in the syntax. Thus, Concord and Feature-Switch could account for the idiosyncratic features on the secondary predicate even before the noun phrase moves out of there. This would at least get rid of the non-locality problem.

Conclusion. We have seen that it is (of course) possible to account for the data with only one set of features and feature-changing rules, but the cost is high. The structural context for the rules is very complex, possibly too complex, and the ordering of the rule with respect to others must be closely examined for consistency.

On the other hand, the introduction of another feature set is suggested by the fact that the two Agreement processes work very differently and target different kinds of words as well as different kinds of features. This accounts for the data nicely, but in effect introduces a new kind of rule, lexical rules. A further problem with this approach is the nature of the features, and their relation to each other. Why can there be the exact same features for GENDER and IND-GENDER? This question should be explored with respect to the bigger question of the organization of the morphological feature space, as for example addressed in (Harley and Ritter, 2002).

References

Morris Halle. The morphology of numeral phrases. In: Sergey Avrutin, Steven Franks, and Ljiljana Progovac, eds., *Annual Workshop on Formal Approaches to Slavic Linguistics: The MIT Meeting*, pp. 178–215. Michigan Slavic Materials 36, Ann Arbor, MI. 1994.

Heidi Harley and Elizabeth Ritter. Person and number in pronouns: A feature-geometric analysis. In: *Language* 78(3):482–526. 2002.

James W. Harris. The exponence of gender in Spanish. In: *Linguistic Inquiry* 22(1):27–62. 1991.

Stephen Wechsler and Larisa Zlatić. *The Many Faces of Agreement*. Stanford Monographs in Linguistics, CSLI Publications, Stanford, CA. 2003.

---

[6]The question is, whether one wants to allow feature-changing rules at any stage of the derivation, for any feature, and in any triggering situation. The answer is of course no, because that would allow the morphology to change everything in principle, and make it much too expressive. A rule that would require reference to the whole syntax tree should therefore most likely be excluded by whatever constraints one has to introduce to reduce generativity.