

A Distributed Morphology Analysis of Croatian Noun Inflection

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Abstract

The Croatian case system shows several peculiarities which deserve closer attention since they might provide an insight into the general system of argument encoding. This essay tries to develop a plausible analysis of the idiosyncrasies of Croatian noun inflection. Drawing on the theory of Distributed Morphology it explains the distribution of vocabulary items, incidences of syncretism and occurrences of allomorphy.

1. Introduction

Looking at Croatian noun inflection from the perspective of Distributed Morphology, one will rapidly realize that proposed analyses of this and related Slavic languages do not provide appropriate explanations for the distribution of vocabulary items, incidences of syncretism, occurrences of allomorphy, which in fact do not seem to be accidental. This essay makes an, in many ways immature, attempt at explaining most of these idiosyncrasies by using the concepts of Distributed Morphology (Halle and Marantz (1993), Harley and Noyer (2003)). I will suggest an analysis that employs the concepts of decomposition of case, number and gender features, specificity-based competition and underspecification. This essay mainly consists of two parts, of which the first tries to give a plausible theory of Croatian noun inflection. First, I will give a summary of the data and explain some peculiarities of Croatian. I will then go on and explain my way of decomposing the relevant grammatical categories and present the vocabulary items, whose feature specifications ensure the correct distribution. In the second part, I will discuss a certain occurrence of allomorphy, which deserves closer attention, since it might provide an insight into the structure of case features.

2. Analysis of Croatian Noun Inflection

2.1. The Data

There are seven cases in Croatian: nominative, genitive, dative, accusative, locative, instrumental and vocative. Sometimes the vocative is said not to be a case, because especially in spoken Croatian it is frequently replaced by the nominative. In this analysis the forms of vocative will be regarded. Most grammars agree that speakers of Croatian distinguish between three inflection classes, which will be referred to as I, II, and III. Number is divided into singular and plural.

(1) Croatian Noun Inflection

Singular		class I	class II	class III
	Nominative	-∅	-a	-∅
	Genitive	-a	-ē	-i
	Dative	-u	-i	-i
	Accusative	=Nom/Gen	-u	=Nom
	Locative	-u	-i	-i
	Instrumental	-om/-em	-ōm	-ju/-i
	Vocative	-e/-u	-o	-i
Plural				
	Nominative	-i	-e	-i
	Genitive	-ā	-ā	-ī
	Dative	-ima	-ima	-ima
	Accusative	-e	-e	-i
	Locative	-ima	-ama	-ima
	Instrumental	-ima	-ama	-ima
	Vocative	=Nom	=Nom	=Nom

Table 1. Croatian Noun Inflection

Remarkable Issues

The paradigms in (1) show several cells which have two phonological forms. Most notably the first paradigm, class I singular, is not always consistent. That is why some grammars of Croatian say that in fact these are two inflection classes. For the present analysis, I will assume that this is not the case, mainly because these are kinds of allomorphy which are not due to the same trigger. I have listed the occurrences of allomorphy below, explaining them in short and stating which of them will be taken into consideration.

Allomorphy due to phonology

The first occurrence of allomorphy can be found in the instrumental and vocative of singular class I. Which one of the allomorphs appears depends on the phonological form of the stem in this case. The first forms in the paradigm (/om/ and /e/) appear if the stem final consonant is hard, the latter (/em/ and /u/) if it is not. In what follows I will ignore this issue and assume the latter as underlying. Nevertheless, the other forms could also be easily incorporated into this analysis.

Allomorphy due to semantics

Like related languages, Croatian features the characteristic allomorphy due to animacy, however with a limited distribution. There is only one form left which distinguishes animate and inanimate entities: accusative singular of class I. Just as in Russian the phonological form can be identical with nominative (inanimate) or genitive (animate). In cases of inanimate entities the phonological realization is null, which does not only occur in nominative but also in nominative and accusative of class III, a well-known syncretism. In cases of an animate entity the form is /a/, a quite unexpected vowel for phonological strings of class I. Not only for these but also for some other reasons I will assume the inanimate cases as underlying.

Allomorphy due to syntax

Similarly, the instrumental of class III shows two different possibilities of phonological realization (/i/ vs /ju/). Unlike the kinds of allomorphy before, this one does not depend on the inflected word but on its adjacencies within the sentence. The instrumental itself can appear in different contexts, as a genuine instrumental, local and temporal (both with special connotations) and after prepositions. Speakers of Croatian distinguish (or distinguished, since some grammars analyze this form as archaic) a governed instrumental and an ungoverned instrumental. The former, which occurs after prepositions, is marked by /i/, which seems to be the elsewhere marker at least for the class III paradigm. Non-governed occurrences obviously need some special marking because in these cases the elsewhere-i is replaced by the much more specific /ju/. The third section addresses this kind of allomorphy in detail.

2.2. Decomposition

Going through the literature of distributed morphology analyses of Slavic languages, I came across different ways of how to decompose case. Jakobson (1958) proposes \pm marginal, \pm directional and \pm quantified and Franks (1995), who revised Jakobson's system suggests \pm locational, \pm quantifying, \pm directional, \pm partial. Müller (2004) analyzing Russian noun inflection uses features like \pm governed, \pm subject and \pm oblique. Since none of those feature sets generates the natural classes one needs to analyze Croatian, I decided to introduce new features, named \pm A, \pm B and \pm C. I deliberately used these features to avoid discussions about how intuitive and plausible those labels are. I will come back to the question of labeling in the third section, providing evidence for at least one of the labels.

Case: Case is decomposed into \pm A, \pm B and \pm C.

		A	B	C
Nominative	\Leftrightarrow	-	+	-
Genitive	\Leftrightarrow	-	-	+
Dative	\Leftrightarrow	+	-	+
Accusative	\Leftrightarrow	-	+	+
Locative	\Leftrightarrow	+	+	+
Instrumental	\Leftrightarrow	+	+	-
Vocative	\Leftrightarrow	-	-	-

I will now illustrate the necessity of these features and their values. This system makes it possible to refer to natural classes to explain nearly all occurrences of intra-paradigmatic syncretism. Feature (+A), for example, expresses the distinction between those cases that have /ma/ in the plural and those that do not. The obligatory nominative-accusative syncretism in Indo-European languages can be analyzed as a result of the natural class (-A,+B). Going through the analysis of markers below, there are several syncretisms, which encourage such an analysis. Since I proposed three binary features, there is one unattested case (+A, -B, -C). In Franks' (1995) system his unattested sets of features are the reason for allomorphy in the instrumental. Since I will suggest another explanation for this phenomenon, this set of features is analyzed as defective.

Gender: There are three inflection classes, which also show trans-paradigmatic syncretisms. Therefore, I decided to decompose them as well.

Keeping up the system, the decomposed features are called $\pm x$ and $\pm y$,¹ although they could probably be renamed as '±class I or II' and '±class II'

Class I:	+x	-y
Class II:	+x	+y
Class III:	-x	-y

Just as with case there is one unattested result, which can be taken to explain the allomorphy of the first class, but as I already said, this type of allomorphy will not be regarded in this paper.

Number: Since Croatian has no dual, I will just assume one binary feature: ±singular (cp. Börjesson (this volume) on Slovenian, which does have a dual number).

2.3. The Vocabulary Items

In what follows I list the vocabulary items and their associated morpho-syntactic features. I will say something about their order and discuss the most interesting forms in detail.

(2) Vocabulary Items and Rules

Vocabulary Items:

1	[+sg,-x,-y,+A,+B,-C]	⇔	/ju/
2	[+sg,+x,+y,-A,-B,+C]	⇔	/ē/
3	[+sg,+x,-y,+A,+B,-C]	⇔	/e/
4	[-sg,+x,-A,+B,+C]	⇔	/e/
5	[-sg,+x,+y,-A,-C]	⇔	/e/
6	[-sg,+x,+y,+A,+B]	⇔	/a/
7	[+sg,+y,-A,+B,-C]	⇔	/a/
8	[+x,-A,-B,+C]	⇔	/a/
9	[+sg,+x,+y,-C]	⇔	/o/
10	[+sg,-y,-A,+B]	⇔	/∅/

¹See Börjesson on Slovenian (this volume), where she uses the same features to decompose the inflection classes, but with a different distribution.

11	[+sg,+x,-y]	⇔	/u/
12	[+sg,-A,+B]	⇔	/u/
13	[]	⇔	/i/

Impoverishment rule:

14	[-C] ⇒ [+C] / [+ governed], [- x,- y]
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Readjustment rules:

15	[+sg,+x,+y,+A,+B,-C]	⇔	+long
16	[+sg,+x,+A,+B,-C]	⇔	+/m/
17	[-sg,-A,-B,+C]	⇔	+long
18	[- sg.+A]	⇔	+/ma/

2.4. Marker Order

The order of the vocabulary items above is not arbitrary, it is sorted in two completely independent respects:

First, they are ordered by the quantity and quality of their features. The more features a marker bears, the higher its position within the order. If there are more markers with the same amount of features, these are also sorted by the following rules:

- (3) Markers that are not restricted to singular or plural apply first.
 Markers that are restricted to plural apply second.
 Markers for singular apply last.

If there are more markers with the same restrictions for number features, their order is guaranteed by gender features. The first gender criteria is x: +x comes before -x comes before no restriction of x. The second gender criterion is y. Notably, the sequence of y must be stipulated differently from that of x. No restriction of y comes before +y comes before -y. To sum up, the hierarchy that ensures the marker order above is the following:

- (4) a. First criterion: Quantity of features
- b. Second criterion: Number:
 No restriction ≫ Restricted to plural ≫ Restricted to singular
- c. Third criterion: Gender:
 ±x: +x ≫ -x ≫ no x
 ±y: no y ≫ +y ≫ -y

Second, the order in (2) reflects some sort of phonological marker hierarchy.

(5) /ju/ >> /ē/ >> /e/ >> /a/ >> /o/ >> /∅/ >> /u/ >> /i/

or, abstract:

(6) Elements with glides >> elements with suprasegmental phonological features >> non-high vowels >> zero-marker >> high vowels

Whether this hierarchy is of importance or not is not a topic of this article, but since it automatically results from the theory above, it might be notable.

2.5. Special inflection markers

Let me now turn to the most interesting inflection markers of the analysis above.

Instrumental singular of class III: /ju/

This marker is quite interesting in many respects. First it is, in this analysis, the most specific marker. Second, it is the only one that is phonologically realized by an element, which does not only consist of a vowel, but also of a glide. And third, it is the only one that might be impoverished throughout the whole paradigm.

Genitive singular of class II: /ē/

This element is striking because it is the only one that already bears phonological information (in this case +long) when coming from the lexicon. In the instrumental, where there is also a long element, this phonological information is a result of a readjustment rule that applies at a later level. In fact, this is a problem which can be solved in two ways. Either one accepts that the marker already bears the phonological feature (+long) in the lexicon as in this analysis or one will have to assume the concept of alpha-notation.² By working with alpha-notation one could analyze both lengthened forms of the singular as a result of the same redundancy rule. Although there is quite

²Chomsky(1965), Chomsky and Halle(1968) and Noyer(1992) in morphology: The concept of alpha-notation makes it possible to refer to several forms which do not share the same features. The different vocabulary items are classified as one not by their morphological features but by their feature values. In this case a rule that renders to combine both lengthened forms would be [+sg, -αA, -αB, αC] ⇔ +long.

good evidence for a concept like alpha-notation, I wanted to avoid too many different theories in this analysis. But in the end I do not think that this makes a crucial difference.

Zero marker: \emptyset

The zero ending shows a well-known distribution. Just as in many Indo-European languages it appears in the nominative and the accusative of the non-feminine (here class I and III) genders. Unlike many distributed morphology theories about the zero marker, in my analysis it is neither the most nor the least specific item; it separates the lower vowels (/a/, /o/, /e/) from the higher ones (/u/ and /i/) (see section "Observations" above).

Elsewhere-Marker: /i/

Looking at the paradigm of (1), it is not hard to imagine which marker will be convenient as the elsewhere-marker. The /i/ can be found in all three genders and all seven cases. Its distribution is not well defined or symmetric in any way. Moreover there are other reasons for this analysis. Assuming that singular is more specific than plural and class I and II are more specific than class III, one always finds /i/ in less specific positions.³

The Readjustment rules: 15-18 One basic presupposition of the whole analysis of this article is that inflection markers like /ima/ (plural, class I, dative) are actually combined forms of the elsewhere-marker /i/ and an additional marker /ma/, which marks all +A-cases in the plural. The four additional rules I propose make it possible to implement the apparent trans-paradigmatic syncretisms like /ima/ and /ama/ and the intra-paradigmatic syncretisms like /ima/ and /i/ in the present analysis. This, in my opinion, is a good way to implement a complete subanalysis of several markers without a concept like fission. A major consequence this theory must face, assuming a concept of combined markers, is that vocabulary insertion cannot delete features because they might be relevant for the readjustment rules that apply on a later level.

³See Börjesson (this volume). In her analysis of Slovene the /i/ also turns out to be the least specific marker.

3. Allomorphy due to syntactic processes

So far I have not addressed the plausibility of the impoverishment rule I proposed to derive instances of allomorphy resulting from syntactic government. Considering the other occurrences of allomorphy for example the form of accusative singular of class I, there seems to be no difference at first sight. Müller (2004) following Noyer (1998) also suggests to derive those kinds of allomorphy by formulating impoverishment rules, which may under certain conditions change features or feature values. This type of impoverishment has often been refuted, because it seems to be too powerful and is incompatible with the underlying concept of impoverishment as deletion. Explaining the current phenomenon I will also adopt some kind of impoverishment rule, which can change features. However, I will show that in this case there is a good reason to suppose that such a rule applies here.

As I have shown above, I assume one impoverishment rule ((2) repeated in (7)) to ensure the correct distribution of markers.

(7) $[-C] \rightarrow [+C] / [+governed], [-x, -y]$

(7) states that the instrumental singular of class III is syncretic with the locative, because feature C is the only one that distinguishes these two cases. Here, the most specific marker /ju/ can sometimes (in cases of government) be replaced by /i/, the least specific marker.

Up to now this impoverishment rule seems to be as stipulated as others, but if we come back to the question what the decomposed case features ($\pm A$, $\pm B$, $\pm C$) mean, the rule above becomes much more plausible. Looking at $\pm C$, which is the only relevant feature for the impoverishment rule in (7), the distribution seems somehow well known.

Nominative:	- C
Accusative:	+C
Genitive:	+C
Dative:	+C
Locative:	+C
Instrumental:	- C
Vocative:	- C

Accusative, genitive, dative and locative share the same feature value +C. According to several theories, all these cases are classified as governed. Nom-

inative and vocative are generally called uncontrolled cases. As I have already mentioned in the second section, the instrumental can occur in two positions, controlled by a preposition or not controlled at all. Assuming that the instrumental is not a controlled case, the proposed impoverishment rule (7) is much more plausible. It just says that feature C, which in fact equals '±controlled' might change its value from -Gov to +Gov, if the instrumental is controlled by a preposition. Consequently, this rule just seems to be an instantiation of a syntactic process that can change feature values of special cases, if they are contradictory to syntax. In what follows I will discuss some consequences of this observation and problems for the analysis I have built on it.

3.1. Discussing the consequences

I have so far presented an analysis that is not perfectly elaborated, and immature in many ways. But as far as I can see now, following my assumptions, this theory leads to several consequences I want to present and discuss in detail. The first point I would like to make is that this theory can back up the assumption that cases are not features that cannot be further decomposed. I have shown that at least one occurrence of allomorphy is a result of syntax manipulating decomposed case features. An alternative theory that does not work with these features could not easily explain why there sometimes is a syncretism between the locative and instrumental singular of class III. As well as having supported theories that decompose case, I have given a good argument for '±controlled' as a relevant feature that distinguishes cases. Only if we assume a feature like that, we can give a good explanation for why there is this strange occurrence of allomorphy.

For every theory that decomposes case the question arises which features should be assumed to provide evidence for some paradigm. But since nearly all of them show different distributions in different systems, I tried to solve at least one problem namely, whether the instrumental is a controlled case or not. In Croatian like in other Slavic languages the instrumental occurs both controlled and uncontrolled. I have tried to show that it is prototypically not controlled and that the observed allomorphy is a result of its occurrence in an unexpected position.

Another assumption I had to make in order for my analysis to work is that syntax plays a role for morphological processes. Intuitively it is the contradiction between syntax and the morphologic feature set of the instrumental that makes the impoverishment rule work. This rule just changes features to avoid a clash as a result of this contradiction. But this means

that syntax can in a certain way refer to decomposed case features otherwise that contradiction would not arise.

The following argument I am going to present supports a thesis which is much more controversial than the ones above. The whole theory is based on one assumption made by Noyer (1998). It says that impoverishment can not only delete features but also change feature values. I think that in this case it is perspicuous that some operation that changes feature values has to apply. I do not think that an analysis that does not assume impoverishment like that could come up with such an easy explanation like the one I presented.

- (8)
- a. Case can be decomposed into smaller features.
 - b. '±Governed' is one of these.
 - c. Though it might occur in both positions, instrumental is originally not a governed case.
 - d. Syntax is relevant for morphological processes like impoverishment.
 - e. Impoverishment can change feature values.

Before I will come to one last question, which could be seen as an apparent problem for this analysis, I want to sum up the purpose of this section in a few words. Going through the Croatian paradigm one finds certain occurrences of allomorphy which have different reasons. Just as in Russian there is allomorphy in the singular accusative of class I, due to semantics (related to animacy). Second, there is allomorphy in the singular instrumental and vocative of class I due to phonology. And third, there is allomorphy due to syntax in the singular instrumental of class III. In contrast to the first two, the last seems to be the result of different morphological features. I have tried to show that in fact the syntax influences the morphology by changing its feature values. By proposing a concept, which accounts for why the syntax intervenes in morphological processes, I also tried to answer the controversial question when feature changing impoverishment might apply.

If this allomorphy is a result of syntactically manipulated features, why isn't there allomorphy in the two first genders or in the plural?

This question really challenges the present analysis. The only plausible explanation for this phenomenon is some theory about markedness. Looking at the paradigm, one can see that the instrumental of Croatian is probably the most marked case of all. The forms of the instrumental are phonologically the heaviest ones throughout the paradigm. But nearly all the heavy forms of these cases are, following my analysis of section 2, generated by the readjustment rules, which probably apply at a later level than the impover-

ishment rule. The only heavy marker which is not a result of the redundancy rules is the one of singular of class III.

I would therefore like to tentatively suggest some kind of economy principle which rules out the marked form /ju/ in all those surroundings where it is not necessary. The other forms are not ruled out, because they are not yet that heavy.

If this kind of impoverishment rule would also apply in the two other genders, one would have never suggested any kind of morphosyntactic process. One would have proposed that the preposition always governs a locative or another case.

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