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## Verbal aspect in Old Church Slavonic

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### Citation

Kamphuis, J. (2016, December 7). *Verbal aspect in Old Church Slavonic*. Retrieved from <https://hdl.handle.net/1887/44706>

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**Title:** Verbal aspect in Old Church Slavonic

**Issue Date:** 2016-12-07

## **7 GRAMMATICAL PROFILE ANALYSIS**

### **7.0 Introduction**

The general picture that emerged in the previous chapter is that some forms strongly interact with the aspectual properties of the verb, resulting in different grammatical profiles for the various groups. Hence, the aspect of a verb restricts its use in certain forms and enhances compatibility with other forms. This phenomenon constitutes the basis for the analysis in the present chapter.

In the present chapter, I will analyse the differences in grammatical profile between the various verb groups. First, I will concentrate on the statistical analysis of the profiles of the groups that I call the ‘core groups’: the perfective and imperfective prefixed verbs, the perfective and imperfective unprefixes and the aspectual verbs (cf. Table 5.3). I will use a correspondence analysis to provide insight into the differences and similarities between the group profiles.<sup>1</sup> Subsequently, I will include other groups in the statistical analysis, like VOMs and Leskien’s class II verbs, to demonstrate how these groups fit in the overall aspect system.

### **7.1 Core groups**

#### **7.1.1 The profiles**

In principle, the group profiles are no different in make-up from profiles of individual verbs, of which I gave an example in section 4.3.1.1. A group profile is simply the aggregate of the individual profiles of the verbs in the group. The profile consists of seven categories: Present, Present participles (Pres. ptc), Imperfect, Imperative, Infinitive/supine (Inf. & Sup.), Past participles (Past ptc) and Aorist.<sup>2</sup> This is the same categorization as used by Eckhoff & Janda (2013), except for the fact that in my analysis the PastAPII are grouped

<sup>1</sup> I use the software package for statistical analysis SPSS. Information on the correspondence analysis in SPSS can, for example, be found in Meulman & Heiser (1999: 45-54 and 147-178). I will use scatterplots to make the results of the correspondence analysis visible and more accessible to those that have no prior knowledge of this statistical analysis.

<sup>2</sup> I will present the verb forms in this order in the bar charts in this chapter. It helps with “reading” the profiles to keep the forms that show affinity with the imperfective group on one side, starting with the present tense, and forms that show affinity with the perfective groups on the other.

together with the other past participles and therefore are not left out of the analysis (cf. section 6.7).<sup>3</sup>

The largest and most homogeneous<sup>4</sup> groups within the core groups are the prefixed perfective and imperfective verbs, which is why I will start out with a comparison of these groups to the group of anaspectual verbs, before considering the unprefixed verbs as well. Table 7.1 below contains the profiles of the prefixed perfective and imperfective groups and the other large group, the anaspectual verbs:

	<i>Ipf prefixed</i> ( <i>ostavljati</i> ) <i>n</i> =3041	<i>Anaspectual</i> ( <i>viděti</i> ) <i>n</i> =26683	<i>Pf prefixed</i> ( <i>ostaviti</i> ) <i>n</i> =15803
<b>Present</b>	37.29%	27.71%	21.61%
<b>Pres. ptcs</b>	31.86%	22.72%	0.59%
<b>Imperfect</b>	16.71%	8.75%	0.15%
<b>Inf. &amp; Sup.</b>	7.89%	6.17%	8.08%
<b>Imperative</b>	4.01%	5.84%	8.59%
<b>Aorist</b>	1.18%	21.71%	35.40%
<b>Past ptcs</b>	1.05%	7.11%	25.58%

Table 7.1 Profiles of the three main core groups

In Table 7.1, the difference in compatibility with certain verb forms that already emerged in the discussion of the verb forms in Chapter 6 is clear: the perfective prefixed group differs the most from the imperfective prefixed group and the anaspectual group takes up a middle position in almost all cases, showing the most even distribution of verb forms. In a bar chart the differences between the profiles becomes immediately apparent:

<sup>3</sup> Running the analysis leaving these relatively rare participles out, has a negligible effect on the outcomes.

<sup>4</sup> The imperfective prefixed group is morphologically much more homogeneous compared to the unprefixed imperfective group. All 455 prefixed imperfective verbs, except for *iskupovati*, *iskupuju* 'redeem' and *naznamenovati*, *naznamenuju* 'give a sign', share the derivational suffix *-ati*, *-aje-*, while in the unprefixed verbs 7 out of the 49 derived verbs have the suffix *-ati*, *-je-* (e.g. *imati*, *jemlju* 'take' and *dajati*, *daju* 'give'). Moreover, the fact that the prefixed verbs (both perfective and imperfective) are attested much more frequently makes for a more stable picture, with less influence of a few large verbs on the group profile. For example, in the unprefixed group the most frequently attested verb *dati* 'give' with 1038 attestations is responsible for 35.44% of the attestations and thus 35% of the group profile, while the most frequently attested verb in the prefixed perfective group, *sъtvoriti* 'do' is responsible for 8.25% of the total attestations. When a few verbs influence the group profile that strongly, the benefit of grouping verbs together to get rid of the influence of the lexical factor (cf. Chapter 4) is obviously reduced.

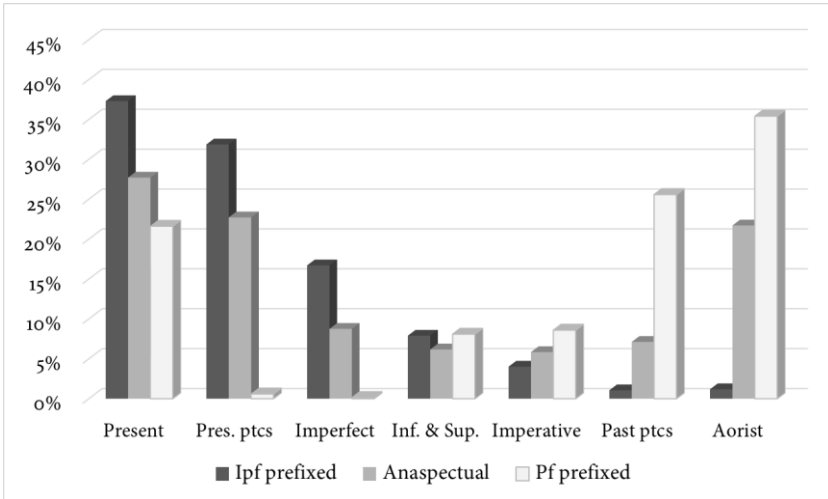


Figure 7.1 Bar chart of the profiles of the three main core groups

The relationship between the prefixed perfective and imperfective groups and the anaspectual groups now being clear, it is interesting to see how the unprefixed imperfective and perfective groups relate to the prefixed groups:

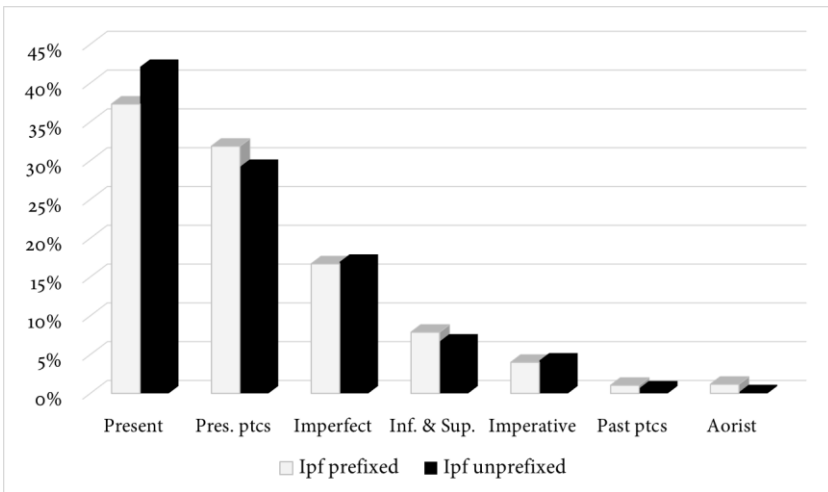


Figure 7.2 Bar chart of the profiles of the two imperfective groups

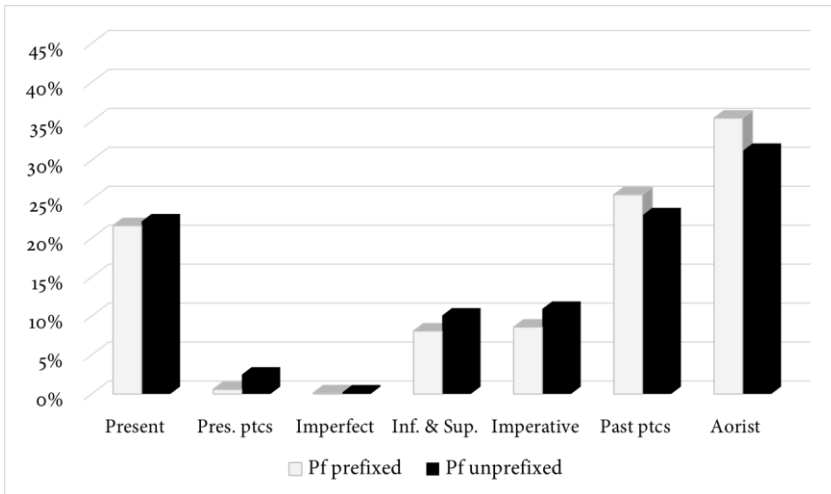


Figure 7.3 Bar chart of the profiles of the two perfective groups

As was to be expected, the profiles of the imperfective and perfective groups are very similar, with only minor differences, mostly between the two perfective groups.

The bar charts give a good impression of the differences and similarities in profiles, but become increasingly difficult to interpret when more groups are added, especially because there are seven categories involved. In the following section I will perform a correspondence analysis and present the data in a two-dimensional graphical form, allowing for an easier comparison between the groups. Moreover, I will perform pair-wise chi-square tests (cf. Butler 1985: 112-126) to determine whether profiles differ significantly from each other, and if so, how much. This is also something that cannot be determined by simply looking at the bar charts.<sup>5</sup>

<sup>5</sup>I should note that significance refers to the question whether the results that I found in my sample (my dataset of OCS verb forms) can be said to be of significance for the population (all verb forms in OCS). However, if OCS is regarded as the compilation of manuscripts as described in Chapter 1, one could say that my dataset contains the (almost) complete set of verb forms attested in OCS, hence is equal to the population, and the differences that I found are simply the differences that are present in OCS. While this puts the importance of the statistical significance into perspective, one could imagine that there are still manuscripts to be found that will be regarded as part of the OCS canon and it is almost certain that many manuscripts that would have been regarded as such have been lost forever. A such, the data in this study could also be seen as a part of a much larger, (yet) unknown corpus of texts, in which case the results could be understood as significant for this larger corpus. Moreover, the statistical method I use also provides useful insight into the effect size of the differences that I found by means of calculating Cramér's V (cf. Janda & Lyashevskaya 2011: 731, with references).

### 7.1.2 Correspondence analysis and pair-wise comparison

One test is particularly useful for the purpose of getting a general idea of the difference and similarities between the various groups. This is the correspondence analysis (CA), a test also used by Eckhoff & Janda (2014) to establish the aspect of OCS verbs based on their grammatical profile, as discussed in Chapter 4. As said, unlike Eckhoff & Janda, I will perform the CA on group profiles and not on individual profiles, for reasons already explained in Chapter 4. In this respect, my approach is more similar to that of Janda & Lyashevskaya (2011), who analyse profiles of groups of verbs in Modern Russian.

The CA that I perform on the profiles of the five core groups reduces the number of factors that explain the difference between the groups to 4.<sup>6</sup> Of these four factors, the largest factor accounts for 96.5% of the variance and the second largest factor accounts for only 3.0% of the variance. The other two factors account for a mere 0.4% of the variance. The scatter plot in Figure 7.4 is based on the two largest dimensions; the largest on the x-axis, and the second largest on the y-axis.

<sup>6</sup> This is the maximum number of dimensions given that the formula for the maximum number of dimensions in a correspondence analysis is  $\min(\text{row}, \text{column}) - 1$ , which in this case is  $\min(5, 7) - 1 = 4$ . (5 is the number of groups in the analysis, 7 is the number of verb form categories; the maximum number of dimensions is one less than the smallest of those two, hence 4).

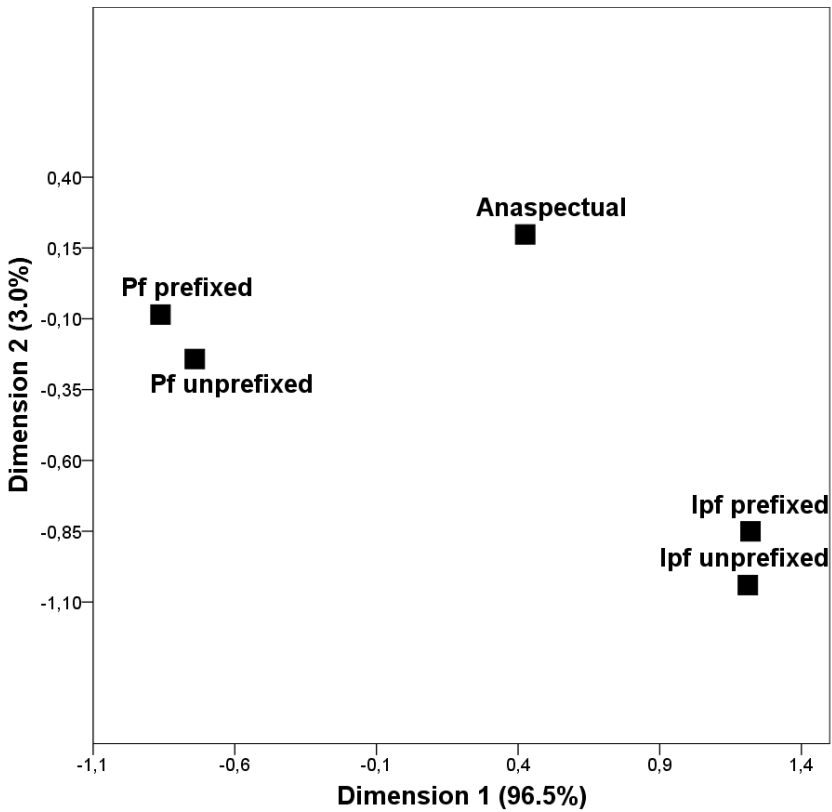


Figure 7.4 Scatter plot based on the two largest factors in the CA

The correspondence analysis also calculates the position of the verb forms on the same dimensions, which makes it possible to plot verb forms and groups in one scatter plot. The affinities between the various groups and verb forms that have already been discussed in Chapter 6 emerge in the representation in Figure 7.5:



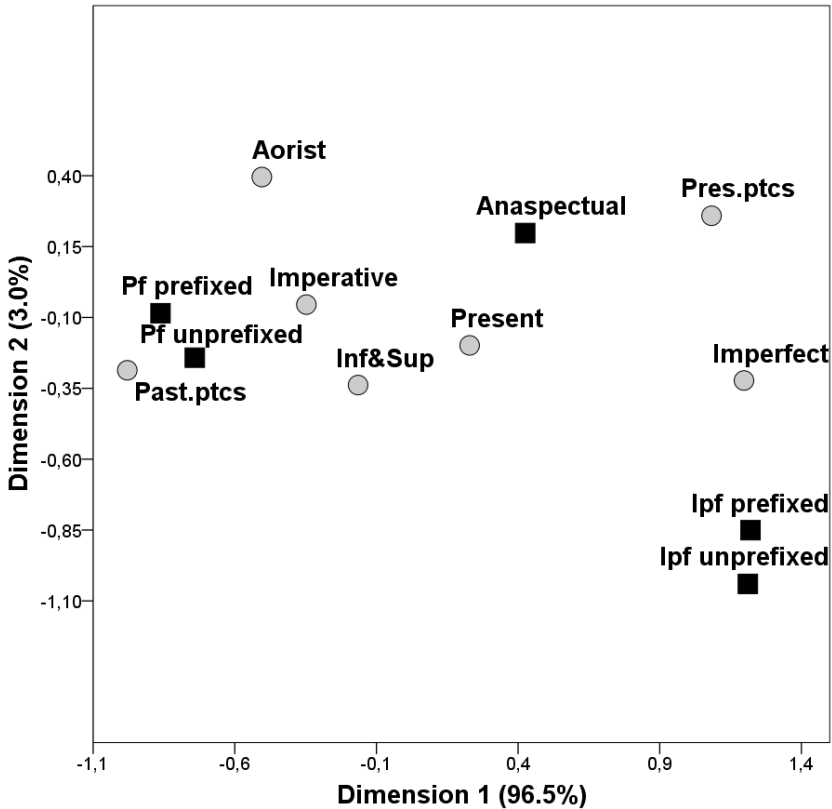


Figure 7.5 Scatter plot including verb forms

Unsurprisingly, the aorist and past participles cluster together with the perfective groups, while the imperfect and present participles cluster together with the imperfective groups.

The largest factor, Dimension 1 on the x-axis, separates the perfective groups on the right side from the imperfective groups on the left side, with the anaspectual verbs in between. Therefore, it seems reasonable to call this dimension the 'Aspect dimension'. In fact, this dimension is responsible for such a large proportion of the variance that the differences between the verb groups could even be meaningfully plotted one-dimensionally, disregarding the other factors:

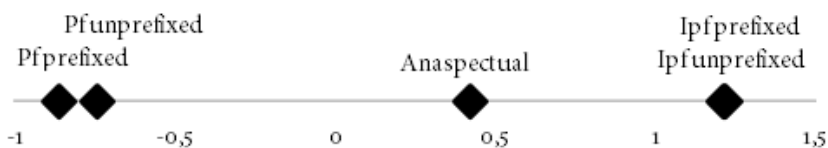


Figure 7.6 One-dimensional representation, Aspect dimension

Figure 7.6 shows that, when considering just one dimension, the profiles of the imperfective groups are (almost) identical, while there is some difference between both perfective groups. The anaspectual group is positioned in between those two extremes, albeit a little closer to the imperfective groups. To determine whether the differences between the groups are significant, I used a chi square test of independence. I tested the groups pairwise, the null hypothesis being that the profiles and the groups are independent (there is no significant difference between the groups) and the alternative hypotheses that profiles and groups are not independent (there is a significant difference between the groups). The tests showed significant differences between all pairs of groups, except for the two imperfective groups.<sup>7</sup>

Given the large amount of data used in this study, the probability of a significant result is very high. This does not reveal much about the size of the difference, though. For instance, in Figure 7.6 it is clear that the distance between the anaspectual group and the perfective prefixed group is greater than the distance between the two perfective groups, even though in both cases the difference between the profiles is significant. To assess the size of

<sup>7</sup> The results of the pairwise  $\chi^2$  tests are as follows:

Group 1	Group 2	$\chi^2$ results
Pf prefixed	Ipf prefixed	8945.18 df = 6 $p < 0.001$
Pf prefixed	Ipf unprefixed	5562.70 df = 6 $p < 0.001$
Pf prefixed	Pf unprefixed	148.12 df = 6 $p < 0.001$
Pf unprefixed	Ipf prefixed	2879.20 df = 6 $p < 0.001$
Pf unprefixed	Ipf unprefixed	1395.78 df = 6 $p < 0.001$
Ipf unprefixed	Ipf prefixed	11.36 df = 6 $p = 0.079$ (n.s.)
Pf prefixed	Anaspectual	8102.60 df = 6 $p < 0.001$
Pf unprefixed	Anaspectual	1831.24 df = 6 $p < 0.001$
Ipf prefixed	Anaspectual	1134.37 df = 6 $p < 0.001$
Ipf unprefixed	Anaspectual	270.34 df = 6 $p < 0.001$

When one tests more hypotheses (like I do by the pairwise testing), the chance of encountering a rare event increases. Lowering of the significance level ( $\alpha$ ) by dividing it by the number of hypotheses tested, the so-called Bonferroni correction, is a way of counteracting this. In this case that results  $\alpha = 0.01/10 = 0.001$ .

the effect, I calculated the Cramér's  $V$  value for all pairwise comparisons. I use the same customary rule of thumb for the interpretation of the Cramér's  $V$  value as Janda & Lyashevskaya (2011: 731, with references) in their study of grammatical profiles of Modern Russian verbs: 0.1 is a small effect size, 0.3 is a medium effect size and 0.5 is a large effect size. Based on the correspondence analysis and the bar charts, I expect to find large effect sizes when comparing perfective and imperfective groups, small effect sizes when comparing the perfective and imperfect groups among themselves and medium effect sizes when comparing the anaspectual group with the imperfective and perfective groups.<sup>8</sup> Table 7.2 lists the Cramér's  $V$  values for the tested pairs:

<i>Group 1</i>	<i>Group 2</i>	<i>Cramér's <math>V^9</math></i>
Pf prefixed	Ipf prefixed	0.717
Pf prefixed	Ipf unprefixd	0.744
Pf prefixed	Pf unprefixd	0.102
Pf unprefixd	Ipf prefixed	0.694
Pf unprefixd	Ipf unprefixd	0.709
Ipf unprefixd	Ipf prefixed	0.083 (n.s.)
Pf prefixed	Anaspectual	0.472
Pf unprefixd	Anaspectual	0.433
Ipf prefixed	Anaspectual	0.380
Ipf unprefixd	Anaspectual	0.407

*Table 7.2 Cramér's  $V$  values for the pairwise chi square tests*

The Cramér's  $V$  values show that even though there are significant differences between all groups except the two imperfective groups, the size of the effect differs greatly. The effect size for the tests in which perfective and imperfective groups are compared is around 0.7. As expected, this is the largest effect size in this dataset. The effect sizes that emerge from the pairwise tests of the perfective and imperfective groups with the anaspectual group, all give an effect size of around 0.4, which, in this dataset, is a medium

<sup>8</sup> In the case of the insignificant difference between the two imperfective groups, the effect size can be ignored, since it is a value for a non-significant difference.

<sup>9</sup> I found that the Cramér's  $V$  value tends to be smaller with increasing differences in group size. Since in this study some of the groups differ greatly in size, I corrected for the unequal group size in a simulation where the ratio between the groups was made to be 1:1, by reducing the size of the largest group to the size of the smallest group. As long as the ratio between the groups is the same,  $N$  does not influence the Cramér's  $V$  value. I will use corrected Cramér's  $V$  values throughout the remainder of this chapter. Unfortunately, I have not been able to find any information in the literature regarding this specific problem of decreasing Cramér's  $V$  values with increasing differences in group sizes.

effect. The effect size in the test of the two perfective groups is small, 0.1, and close to the effect size found for the insignificant difference between the two imperfective groups. The Cramér's V values correspond to the differences in distance between the groups as seen in Figure 7.4, Figure 7.5 and Figure 7.6, showing that those graphical representations are a reliable depiction of the relationship between the grammatical profiles of the five groups.

The basic picture that emerges from the tests with the five core groups is the following: the CA of the grammatical profiles of the group results in an aspect dimension that can explain 96.5% of the variance in the data. On this aspect dimension the perfective and imperfective groups are on the opposite sides with the anaspectual group in between. The verb forms are positioned on the same dimension, with imperfect and present participles showing attraction to the imperfective side of the dimension and aorist and past participles a similarly attraction to the perfective side of the dimension, followed by the imperative. This is all in line with the analysis of the verb forms in Chapter 6.

I should note that the dimension I call aspect dimension does not reveal whether a group expresses Slavic-style aspect or not. The mere fact that the aorist is also on the right hand side, while it does not express Slavic-style perfective aspect, shows that the aspect dimension is not limited to Slavic-style aspect. Temporal boundedness and the attainment of an inherent boundary are closely related concepts (cf. Lindstedt 1995: 241) and this emerges from the analysis as well. Without closely studying individual examples it is not possible to confirm the hypothesis that the morphological characteristics of a verb are a good indicator of its Slavic-style aspect. Therefore, I will give a semantic evaluation of the core groups in Chapter 8 to determine the role of the main lexical factor underlying Slavic-style aspect, terminativity, in those groups.

### **7.2 Inclusion of the other groups in the analysis**

Now that the basic picture of the aspect dimension is clear, it is time to include other groups into the analysis. For the analysis with the other groups I performed the same test, a CA from which the aspect dimension again emerged, accounting for 91% of the variance, very similar to the aspect dimension in the analysis of the core groups. In Table 7.3 below are the scores for all groups (including the five core groups) on the aspect dimension in this correspondence analysis,<sup>10</sup> starting with the groups that are on the extreme

<sup>10</sup> I entered *byti* 'be' as a so-called supplementary category, which means that its position is calculated with regard to the other groups, but the profile is not factored in, in the analysis. There are two reasons for this: first, the profile of *byti* includes three forms (future, future participle and conditional) that are not included in the analysis, which makes a fair comparison of *byti* with the other groups difficult. Secondly, in a simulation the inclusion of *byti* in the analysis distorted the

perfective side of the aspectual dimension and ending with the groups that are on the extreme imperfective side.

<i>Name of the group</i>	<i>Aspect dim. score</i>
Leskien II unprefixes with partner ( <i>kanŕti</i> )	-0.819
Prefixes determinate VOM with partner ( <i>vŕniti</i> )	-0.781
Leskien II prefixes with partner ( <i>pomanŕti</i> )	-0.722
<b>Perfective prefixed (<i>ostaviti</i>)</b>	<b>-0.717</b>
<b>Perfective unprefixes (<i>aviti se</i>)</b>	<b>-0.601</b>
Prefixes with two partners ( <i>sŕpovŕdŕti</i> )	-0.592
Prefixes without attested suffixed ( <i>ubojati se</i> )	-0.413
Determinate VOM ( <i>iti</i> )	0.023
<b>Anaspectual (<i>vidŕti</i>)</b>	<b>0.585</b>
Suffixed prefixes with other suffixed ( <i>sŕpovŕdati</i> )	0.687
<i>byti</i> 'be'	0.740
Unprefixes partner Leskien II ( <i>kapati</i> )	1.073
Suffixed prefixes, other suffixed ( <i>sŕpovŕdovati</i> )	1.337
<b>Imperfective unprefixes (<i>avljati se</i>)</b>	<b>1.366</b>
<b>Imperfective prefixes (<i>ostavljati</i>)</b>	<b>1.390</b>
Indeterminate VOM ( <i>xoditi</i> )	1.423
Prefixes partner Leskien II ( <i>pomajati</i> )	1.487
Prefixes indeterminate VOM ( <i>vŕxoditi</i> )	1.587

Table 7.3 Scores on the aspect dimension<sup>11</sup>

The scatter plot based on the CA shows that a number of clusters can be discerned. To keep the scatter plot readable, I will use the exemplary verbs included in Table 7.3 as a designation for the total group in the scatter plot:

graphic representation on dimension 2 on the y-axis, even though the aspect dimensions scores were very similar after the inclusion of *byti*.

<sup>11</sup> Core groups are printed in boldface.

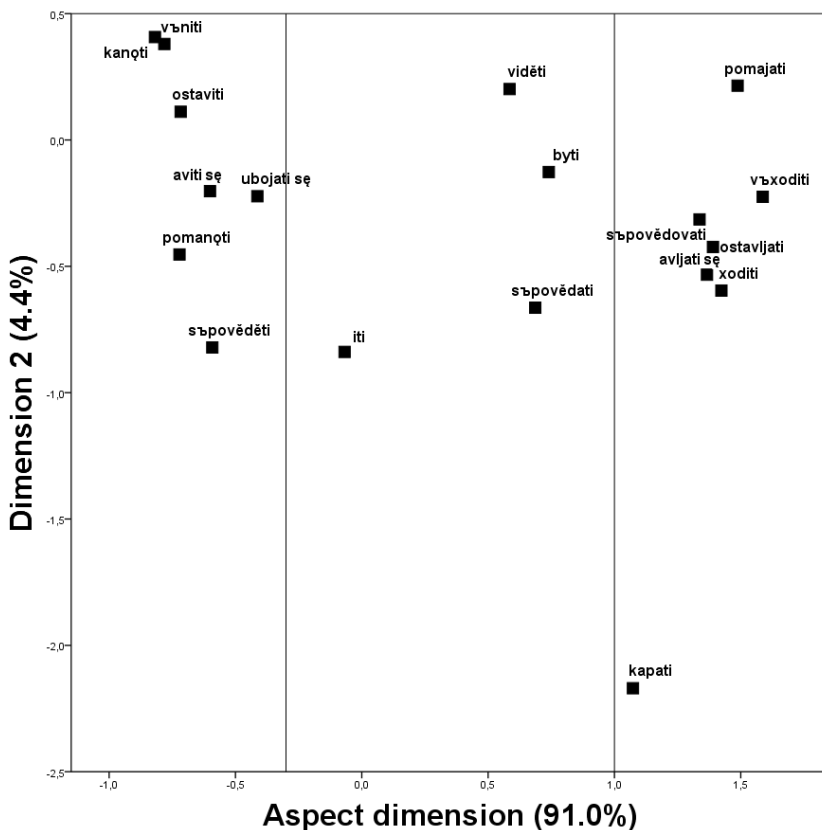


Figure 7.7 Correspondence analysis including other groups<sup>12</sup>

Concentrating on the aspect dimension, I drew two lines in the scatter plot to make the three clusters that I discern based on morphological characteristics visible. The lines are just as arbitrary as the line that Eckhoff & Janda (2014: 238) draw at zero and have no consequences for the final assessment of the aspect of the verbs in the group. They are only there as a visual aid. In the discussion it will become clear that the position in one of the three clusters reveals much about similarities and dissimilarities of the verbs in the various

<sup>12</sup> The picture is somewhat distorted because of changes on Dimension 2 compared to the first CA, probably mainly caused by the imperative, which scores low on that dimension. The *kapati*-group has 31% imperatives, which is a relatively high percentage thanks to the verb *drŋzati* 'be brave', which is frequently used in the imperative (21 times, 84% of the total attestations of the verb). This explains the great distance between *kapati* and the rest of the groups on Dimension 2. However, Dimension 2 is still only responsible for 4.4% of the variation, and is dwarfed by the Aspect dimension with 91.0%.

groups with the verbs in the five core groups, and thus about the aspectual character of those verbs. However, the semantic analysis of individual examples of the non-core groups in Chapter 9 also reveals that there is no one-to-one relationship between the position of the group on the aspect dimension and the aspect of individual members of that group (cf. the difference between terminative and aterminative prefixed verbs in section 9.1, or the discussion of unprefixed verbs of motion in section 9.4). This shows that more levels of analysis are necessary to draw a final conclusion about the aspect of individual verbs.

The three clusters that can be discerned in Figure 7.7 are: the perfective cluster on the left side, starting with the group *kanŕti* and ending with *ubojati sŕ*. Then there is the group *iti*, which is rather close to the perfective side, but which also can be seen as part of a large anaspectual cluster in the middle together with the groups *vidŕti*, *byti* and *sŕpovŕdati*. Finally, there is the imperfective cluster on the right side, starting on the far right with the group *vŕxoditi* and ending with *kapati*.

The scatter plot shows that Dimension 1 is not distorted by the inclusion of the other groups, which is why I still call it the Aspect dimension. Aspect is clearly the main factor when it comes to the differences in grammatical profile between the various morphologically defined groups. Moreover, the aspect dimension still accounts for 91.0% of the variance in the data.

### 7.3 Concluding remarks

In this chapter I have demonstrated that verbs that are classified based on the morphological characteristics of prefixation, suffixation and derivational relationship score differently on the aspect dimension. As expected, the perfective and imperfective verbs differ the most and the anaspectual verbs take up a position in the middle. The basic picture, emerging from the analysis of the grammatical profiles of the core groups, perfective, imperfective and anaspectual, shows that anaspectual verbs have a more even distribution of verb forms than the perfective and imperfective verbs. The perfective verbs, on the other hand, have an uneven distribution and are the most compatible with aorist and past participles, while imperfective verbs also have an uneven distribution and show compatibility with the imperfect and present participles. This is the first step in the confirmation of the hypothesis that the morphological characteristics of a verb are a good indicator of its aspect.

In the following chapter, Chapter 8, I will first discuss the core groups. Subsequently, in Chapter 9, I will discuss the status of the additional groups.

