Being and becoming in Old Church Slavonic: The grammatical and constructional profiles of *byti*

Abstract

There is controversy over whether *byti* 'be' in Old Church Slavonic functioned as an imperfective verb with an unusually large number of inflected forms or as an aspectual pair of verbs, reflecting its suppletive origin from two stems (*es-* and *bū-*). We offer an objective empirical approach to the status of this verb. We present corpus data comprising 2,428 attestations of *byti*, and apply two methods to analyze this data: grammatical profiles (the frequency distribution of the verb's inflected forms) and constructional profiles (the frequency distribution of the grammatical constructions the verb appears in). While we find some evidence in support of an aspectual pair, most evidence points instead toward a single verb. Our findings make both theoretical and descriptive advances. The radial category structure is a central tenet of cognitive linguistics, but until now such structures have usually been pieced together by researchers. We show that it is possible to identify both the nodes and the structure of a radial category using only linguistic data as input. We provide an enhanced description of *byti* that clearly distinguishes between core uses and those that are more peripheral and shows the relationships among them. We also address problematic issues such as the status of the imperfect and the "future" tense (*bǫdetъ*). Our study moves beyond a strict structuralist interpretation of the behavior of *byti*, instead recognizing the real variation and ambiguity in the data.

1. Introduction

In Old Church Slavonic (OCS), as in many other languages, the 'be' verb, *byti*, is special in several ways, with a particularly wide range of forms and a rich inventory of constructions. Scholarly studies of OCS verbs tend to deflect focus from *byti*, setting it apart from all other verbs as "exceptional" and pointing out that it corresponds to two verbs in Greek: the stative *eimi* 'be' and *gignomai* 'become' which expresses a change of state. Van Schooneveld (1951) argued that *byti* was in fact not one verb, but two, namely an aspectual pair, an opinion that is often repeated in literature on the aspectual behavior of the verb in both OCS and the modern Slavic languages. In this article we argue, on the basis of new empirical methods, that *byti* should be neither ignored nor split. We apply two types of linguistic profiling -- grammatical profiling and constructional profiling -- to OCS data to give a more nuanced analysis of this verb.

Some scholars maintain that verbal aspect in Russian, for example, is actually an inflectional category, in which case there are not pairs of verbs, but single lexemes inflected for aspect (see Percov 1998 and Janda 2007 for references and further discussion). However, for the purposes of this article, we will consider an aspectual pair to consist of two verbs.

We find that the grammatical behavior of *byti* is neatly integrated into the overall picture of the OCS verb inventory, and in this context *byti* is best interpreted as a single verb. The use of *byti* across grammatical constructions is likewise indicative of a single verb rather than a pair of verbs because the aspectual contrast we would expect to find with an aspectual pair is lacking. Each grammatical construction is strongly attracted only to certain grammatical forms

of *byti*, these rarely involve possible aspectual contrasts, and even when contrasts might be possible, closer analysis of examples does not support positing a verb pair. We are able to offer a radial category analysis of the grammatical constructions themselves, which gives us a comprehensive yet detailed picture of how *byti* is used, showing that the auxiliary and impersonal uses are clearly distinct both from each other and from all other uses, copular uses form a cluster, and another cluster collects the remaining uses. This result is important, given the status of the radial category in theoretical linguistics. A radial category is the structure expected for any polysemous linguistic unit, with prototypical, central uses related in a structured way to each other and to less prototypical, peripheral uses (Lakoff 1987, Lewandowska-Tomaszczyk 2007).

Our argument is organized as follows. In section 2 we present the paradigm of *byti* and the scholarly debate to date on its status as a single verb vs. an aspectual pair. Next we introduce the PROIEL corpus that our study is based on and the methods of grammatical and constructional profiling in section 3. Section 4 describes our grammatical profiling analysis of *byti* with respect to other OCS verbs. Constructional profiling of *byti* is the topic of section 5, where we first identify the relevant constructions and then show how they are grouped according to the grammatical profiles of *byti* in those constructions. This section probes the data for possible evidence of aspectual contrast. We close with conclusions in section 6.

2. Why is *byti* special?

Indeed, *byti* is special in most respects. It is by far the most frequent verb in OCS, comprising 13.8% (2,428 examples) of all verb attestations in our dataset (see section 3.1). *Byti* occurs in a particularly wide range of grammatical constructions, some of which are unique to this verb, which appears as a regular auxiliary in the perfect tense, and plays an auxiliary-like role with other participles as well. *Byti* is also special from a formal point of view: it is historically cobbled together from two verbs (*es-*, *bū-*; see Vasmer 1976: 159, 405; Shevelov 1965: 96, 238), and the alternation between the two stems is still clearly visible in the OCS forms.[1] The verb also translates both Greek *eimi* 'be' and *gignomai* 'become'. This relationship to two distinct Greek verbs has led several scholars (see section 2.1) to question the unity of OCS *byti* as a verb, since a stative 'be' meaning can be associated with the *es*-stem, whereas a change-of-state 'become' meaning can be associated with the *bū*-stem. Due to its historical origins, the verb has a more complicated inventory of subparadigms than other OCS verbs, as documented in Table 1.

	Morphological subparadigm	*es*-stem	*bū*-stem
"duplicate" forms for *es*-stem and *bū*-stem	present	*jestъ*	*bǫdetъ*
	imperfect	*běaše*	**bǫdeaše*[2]
	aorist	*bě*	*by(stъ)*
	present participle	*sǫšt-*	*bǫdǫšt-*
unique forms	subjunctive	*bi*	

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[1] Here we follow the tradition of positing two origins for *byti*, but recognize that the grouping of forms according to an *es*-stem vs. a *bū*-stem is a simplification.
[2] Not attested in canonical Old Church Slavonic.

"shared" forms	past participle		*byvъ*
	imperative		*bǫdi*
	infinitive		*byti*
	l-form		*bylъ*

Table 1: The *byti* paradigm organized according to stem and morphology

Each cell in Table 1 represents an entire subparadigm, with the third person singular form shown for subparadigms that inflect for number and person (present, imperfect, aorist, subjunctive); the stem for the present participle; the masculine singular (nominative) form for the past participle and *l*-form; the second person singular for the imperative; and the uninflected infinitive form. The columns of the table separate the forms traditionally associated with the *es*-stem from those associated with the *bū*-stem. Each row presents a morphological subparadigm distinguished by its formal characteristics. The etymological distinction between the *es*-stem and the *bū*-stem is somewhat blurred for the subparadigms of the *es*-imperfect, *es*-aorist, and subjunctive, all of which begin with a *b*- which has probably been incorporated from the *bū*-stem (Shevelov 1965: 96, Rix 2001: 242).

  From Table 1 we see that there are three kinds of subparadigms for *byti*: subparadigms with "duplicate" forms for both the *es*-stem and the *bū*-stem (present, imperfect, aorist, present participle); a subparadigm with only *es*-stem forms (the subjunctive/conditional, which is unique to *byti*); and several subparadigms with only *bū*-stem forms (the past participle, imperative, infinitive, and *l*-form). This last group can also be though of as the "shared" forms in the sense that they are common to both the *es*-stem and the *bū*-stem, since these are all forms that a typical verb has (as opposed to the subjunctive, which is atypical); without these forms, the *es*-stem would have a defective paradigm.

  We use the combination of stem and subparadigm labels to distinguish among the "duplicate" forms thus: *es*-present vs. *bū*-present, *es*-imperfect vs. *bū*-imperfect, etc.

  Table 2 shows the Greek correspondences to corpus data (see section 3.1), with the forms that are most frequently used to render *eimi* 'be' toward the top of the table and those most used to render *gignomai* 'become' toward the bottom, and others arranged according to percentages. If we look at the *es*-aorist, for example, we see that there are 230 examples that render Greek *eimi*, accounting for 99.1% of relevant examples, as opposed to only 2 examples (0.9%) that render *gignomai*. Table 2 includes only *byti* occurrences that correspond to either *eimi* or *gignomai* in Greek, and all of these are from the *Codex Marianus*. Note that OCS auxiliaries very rarely have Greek correspondences, which means that the subjunctive is almost absent from Table 2. Also absent from Table 2 is the *bū*-present participle, which usually renders Greek *mellō* 'intend, think of, be about to (do)'.

	eimi # of examples	percent *eimi*	*gignomai* # of examples	percent *gignomai*
es-present	670	100.0%	0	0.0%
es-aorist	230	99.1%	2	0.9%
es-imperfect	46	97.9%	1	2.1%
es-present	45	97.8%	1	2.2%

participle				
l-form	16	84.2%	3	15.8%
subjunctive	3	75.0%	1	25.0%
bū-present	145	74.0%	51	26.0%
infinitive	26	61.9%	16	38.1%
imperative	11	42.1%	8	57.9%
bū-aorist	4	2.8%	140	97.2%
bū-past participle	0	0.0%	49	100.0%

Table 2: Distribution of *eimi* and *gignomai* as source lemma across *byti* subparadigms

Table 2 reveals that the division between the *es*-stem and the *bū*-stem in Table 1 is perhaps not so clear. It works well for the *es*-stem "duplicate" forms which all have nearly perfect correspondence to Greek *eimi*, and it also works well for two of the *bū*-stem duplicate forms, namely the *bū*-aorist and the *bū*-past participle. But both the *l*-form and the *bū*-present are mostly used to render Greek *eimi*, and the infinitive and imperative are clearly "shared" forms with no very strong preferences. These data comport fairly well with most of Dostál's (1954: 146-154) aspectual description of *byti*: he lists the *es*-aorist, *es*-imperfect, *es*-present participle, and the *l*-form (where *eimi* dominates) as imperfective; and he lists the *bū*-present, the imperative, and the infinitive as mostly imperfective. However, he finds the *bū*-aorist and *bū*-past participle (where *gignomai* dominates) to be more evenly divided across perfective and imperfective uses.

These Greek correspondences serve as rough semantic tags indicating the relative share of stative versus change-of-state meanings for the various *byti* subparadigms. We refer to the Greek correspondences throughout our analysis (see section 5), because the Greek gives us an approximate independent measure of semantic differences.

Table 1 makes it look like there is quite some potential for aspectual contrast between the *es*-stem and the *bū*-stem, but it also conceals a number of important issues concerning the "duplicate" forms. The difference between the *es*-present and the *bū*-present may already be shifting in OCS to a difference of tense (present vs. future) rather than aspect. We investigate possible contrasts between the two presents in section 5. In the imperfect, the *es*-stem *běaše* has a defective subparadigm consisting only of third person forms, and the elusive *bū*-stem **bǫdeaše* is not attested in our corpus or in canonical OCS at all. The relationship between the *es*-aorist and the *bū*-aorist is contested, as documented in section 2.1, and again we investigate possible contrasts in section 5. As concerns the present participle, the *bū*-stem *bǫdǫšt-* is relatively rare, and thus does not provide much contrast with the *es*-stem *sǫšt-*; note also that Dostál (1954: 148-149) considers *bǫdǫšt-* to be an adjective, not a participle.

In sum, it appears that *byti* has "duplicate" forms that can potentially contrast only in the present and aorist. This verb has a unique subjunctive subparadigm, largely lacks a proper imperfect, but otherwise has a normal collection of forms. As we see in section 2.1, scholars are divided over how to make sense of the *byti* paradigm, particularly with respect to the imperfect and aorist forms.

2.1 Previous scholarship on the *byti* paradigm

We can view previous scholarship in terms of two hypotheses:

(1) One-verb hypothesis: *byti* is a single verb that has a more complicated paradigm than other verbs.

(2) Two-verb hypothesis: *byti* is an aspectual pair, with perfective and imperfective paradigms.

The clearest statement of a position on this controversy comes from van Schooneveld (1951), who argues that *byti* is in fact an aspectual pair of verbs (hypothesis 2), with opposing imperfective and perfective paradigms as outlined in Table 3. Key to the controversy concerning the status of *byti* is the subparadigm of the *es*-aorist.

	imperfective *es-*	perfective *bū-*
present	*jestъ*	*bǫdetъ*
imperfect	*běaše*	**bǫdeaše*
aorist	*bě*	*by(stъ)*

Table 3: Van Schooneveld's distribution of forms of *byti* as aspectually opposed verbs

Van Schooneveld's view of *byti* as an aspectual pair is reflected in several later works on Late Common Slavic (Schenker 1995: 144), OCS (Remneva et al. 1999: 77, Krivčik and Možejko 1974: 141), and even modern Slavic languages (Junghans 1997, Błaszczak 2009). Overall, the majority of works on OCS classify the *es*-aorist *bě* as an aorist, though typically with some reservations. Van Wijk (1931: 226) notes that it "is used as an imperfect" ("als ein Imperfekt verwendet wird"). This view is echoed by Seliščev (1951: 169) "These forms were used in the meaning of the imperfect" ("Эти формы применялись в значении имперфекта"), Ivanova (1977: 145) "these aorist forms based on the imperfect are used in the meaning of the imperfect" ("эти формы аориста от основы имперфекта употребляются в значении имперфекта"), and Večerka (1984: 141) "they have the form of the aorist, but the meaning of the imperfect" ("jsou co do formy aorist, co do významu imperfektum"). Others, while still classifying *bě* as an aorist, comment on the form as problematic: Lunt (1959: 121) notes "some degree of confusion" between the *es*-aorist *bě* and the imperfect *běaše*; Xaburgaev (1974: 282-283) calls the *es*-aorist an "aorist with an "imperfective" base" ("аорист с "имперфективной" основой"). Gasparov (2001: 139) refuses to classify the *es*-aorist at all, instead listing it as a separate subparadigm: "Alongside regular paradigms for Aor. and Imp., *byti* had a third, hybrid aorist-imperfect form. It was built on the stem of the imperfect *bě*-, but used the formative suffix and the endings of the sigmatic aorist".

Alternatively, and despite the formal identity of the *bě* subparadigm as an aorist, some scholars simply classify the *es*-aorist as an imperfect (Diels 1932: 276; Vaillant 1948: 228, 298; Dostál 1954: 150; Meillet 1965: 274-275; Trubetzkoy 1968: 179; Schmalstieg 1976: 135; Elkina 1960: 168; Gardiner 1984: 80). None of these dissenters from the aorist interpretation offer any comparable counterargument to van Schooneveld, but together they can be considered

proponents of the one-verb hypothesis (hypothesis 1), because they posit one set of forms for the imperfect and one for the aorist rather than "duplicate" forms.

Van Schooneveld's argument that OCS *byti* was in fact an aspectual pair of verbs rests on several problematic assumptions and does not take into account the full range of facts and data available. Contrary to the view of most standard grammars, which state that the *es*-imperfect and the *es*-aorist are semantically indistinguishable, van Schooneveld argues that the two subparadigms do differ semantically, in that the *es*- imperfect expresses simultaneity, whereas the *es*-aorist does not.[3] He supports his argument with a few examples, but there is no indication that he has tested his hypothesis against a large data set.

Van Schooneveld's approach entails that the *bū*-present is in fact a perfective present, rather than an aspectually neutral future tense. He makes this claim (van Schooneveld 1951: 103), but supports it with no evidence.

Furthermore, van Schooneveld simply disregards the "shared" forms, and does not present any views about the properties of the infinitive (*byti*), the imperative (*bǫdi*) and the *l*-form (*bylъ*). These forms are all from the *bū*-stem, but it is implausible that they should be restricted only to perfective meanings, and such a hypothesis is not supported by the Greek correspondences in Table 2. Van Schooneveld leaves us with two options, both of which are unattractive: either we can assign the "shared" forms to the *bū*-stem only, which would leave the *es*-stem with no infinitive, imperative, or *l*-form; or we can claim that *byti* was biaspectual in the "shared" forms, but aspectually distinct in the others.

Finally, we argue that van Schooneveld's strictly structuralist approach gives an impoverished description of the verb. The reality of *byti*'s behavior is much more complex than what can be captured by assigning absolute contrastive values such as "perfective" and "imperfective" to various subparadigms.

Our approach is to test the two hypotheses against a large set of corpus data on *byti*. Rather than making a priori assumptions, we will use statistical methods to discover the patterns in the use of *byti* and thus allow a richer description to emerge from the data.

3. Data and Method

In this section we present the PROIEL corpus and our dataset of *byti* examples extracted from that corpus. Note that our entire dataset, plus the statistical code used to analyze this data is available at URL, and the reader is encouraged to inspect the data and validate the results. Further we describe the two profiling techniques that we apply, namely grammatical and constructional profiling, and the statistical method of correspondence analysis, which is used to probe the profiles for patterns. We conclude this section with a discussion of how we

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[3] This is also van Schooneveld's general definition of the difference between the imperfect and the aorist in OCS; the imperfect is the marked partner and is [+ past, +simultaneous], whereas the aorist is the unmarked partner and is just [+past]. Detailed studies of the semantics of the OCS imperfect and aorist make this analysis seem unlikely because the imperfect is not restricted to denoting eventualities that are simultaneous with another eventuality, but has a generalized imperfective semantics on a par with that found in e.g. Ancient Greek (Amse-De Jong 1974, Eckhoff & Haug under submission).

handle the challenges posed by *byti*'s unusual collection of forms and the aim of objectively evaluating the one-verb vs. two-verb hypotheses.

3.1 The PROIEL corpus and the *byti* data

PROIEL (http://foni.uio.no:3000/; created at the University of Oslo) is a parallel corpus of Ancient Greek, Old Church Slavonic, Classical Armenian, Gothic and Latin. The Old Church Slavonic portion of PROIEL consists primarily of Codex Marianus (a gospel), supplemented by portions of Codex Zographensis (another gospel) and Codex Suprasliensis (saints' lives); all three date from approximately the tenth-eleventh centuries, and all belong to the canon of texts that defines Old Church Slavonic. At the time when we extracted our data (September 2011), the total size of the Old Church Slavonic portion of PROIEL was approximately 62,000 words.

Our data set consists of 2,428 attestations of *byti* from Codex Marianus, Codex Suprasliensis, and Codex Zographensis. Each attestation is represented as a row in the database listing the context (sentence) along with various identifiers for the source, location in the text, morphosyntactic features and argument structure, and the Greek parallel verb (where relevant). In other words, every example sentence has a unique code that identifies its source (e.g. Marianus) and location (e.g. Mark 2.18), plus numerous tags reflecting the morphological form of the verb and its syntactic context (arguments and their case marking, adverbs, etc.). The columns in the database present the various codes and tags. While most of the tags come directly from PROIEL, additional tags labeling the grammatical construction were added via the methods described in section 5.

3.2 Linguistic profiling and statistical representation of data

Grammatical and constructional profiling are means for operationalizing theoretical questions concerning the form-meaning relationship in language and the structure of linguistic categories. Profiling methods belong to a usage-based approach to linguistics (Langacker 2013), according to which generalizations emerge from language data. This approach assumes that meaning is the central motivation for all language, yielding the expectation that differences in behavior (distribution of forms) are motivated (though not specifically predicted) by differences in meaning. As a result, it is possible to use the distribution of forms to probe their meanings.

Linguistic profiling draws upon a long history of work on the behavioral profiles of words (Firth 1957, Harris 1970, Hanks 1996, Geeraerts et al. 1999, Speelman et al. 2003, Divjak & Gries 2006, Gries & Divjak 2009), employing comprehensive sets of tags for a wide range of linguistic factors, among them morphological, syntactic, semantic and lexical factors. By contrast, grammatical and constructional profiling focus on morphological and syntactic features respectively, thus providing a tighter focus and data that is more tractable for interpretation.

We will apply the profiling methods that are most relevant to our investigation of aspectual and semantic behavior, namely grammatical profiling and constructional profiling, as detailed in this section. The data that the grammatical profiles yield must be represented in a fashion that facilitates their interpretation, and for this purpose we will use componential analysis as described below.

3.2.1 Grammatical profiling

Grammatical profiling examines the relationship between the frequency distribution of inflectional forms and linguistic categories. Grammatical profiling is inspired by the observation that some words are used more frequently in some forms of their paradigm than others. Perhaps the earliest relevant study of grammatical profiling was done by Karlsson (1985, 1986), who showed that the corpus attestations of most Finnish words involve a restricted number of paradigm forms, a finding confirmed in a more recent statistical analysis of Finnish verbs (Arppe 2001, 2005). Similar findings of skewed distributions of paradigm forms have been found for English verbs by Newman and Rice (Newman 2008; Newman & Rice 2006; Rice & Newman 2005). An important generalization emerges: each individual word has a unique grammatical profile, a unique set of preferences for distribution across its paradigm forms.

     Janda and Lyashevskaya (2011) used grammatical profiling to reveal a strong relationship between the inflected forms of Russian verbs in the Russian National Corpus (ruscorpora.ru) and the expression of perfective vs. imperfective aspect. They found that the grammatical profiles of perfective verbs were significantly different from the grammatical profiles of imperfective verbs.[4] In other words, the frequency distribution (relative distribution across present, past, imperative, infinitive) of perfective verbs was clearly different from that of imperfective verbs. Grammatical profiling has further been used to test Dostál's classification of OCS verbs as perfective vs. imperfective (Eckhoff and Janda 2013, see also section 4) and to probe gender stereotypes in Russian as reflected by use of masculine vs. feminine past tense forms (Kuznetsova 2013: Chapter 3).

     An essential issue for the present study is the aspectual status of *byti*: is it a single verb (hypothesis 1), or is it an aspectual pair of verbs (hypothesis 2)? Given that it is already known that there is a relationship between the grammatical profiles of verbs and aspect in both Russian (Janda and Lyashevskaya 2011) and OCS (Eckhoff and Janda 2013), it is reasonable to use grammatical profiles to probe the aspectual behavior of *byti* as well. In this study we look at the frequency of *byti* forms in its subparadigms (see Table 1) and see how these compare with other OCS verbs (section 4) and further apply grammatical profiling in conjunction with constructional profiling to discover how the grammatical forms are distributed across the constructions that *byti* appears in (section 5).

3.2.2 Constructional profiling

Constructional profiling examines the relationship between the frequency distribution of the grammatical constructions a word appears in and its meaning. As with grammatical profiling, this method focuses on the uneven distributions

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[4] The result was statistically significant with a robust effect size (N = 5951250, chi-squared = 947756, df = 3, p-value < 2.2e-16, Cramer's V = 0.399). The aggregate grammatical profile of imperfective verbs has its peak in non-past forms with 47%, followed by the past (33%), infinitive (17%) and imperative (3%). The peak in the grammatical profile of perfective verbs is the past, with 63%, followed by the infinitive (22%), the non-past (12%) and the imperative (3%). The Janda and Lyashevskaya study specifically excluded grammatical forms that are restricted by aspect in modern Russian, namely gerunds and participles, and also excluded the verb *byt'* 'be'.

of forms found in language and the fact that any given word has a "signature", a unique distribution of forms. Any given word can potentially appear in a large range of grammatical constructions, but when we look in a corpus we find that the actual range of attested constructions is smaller and unique to that word. Constructional profiling is a prominent component of relevant studies of synonymy, such as Geeraerts 1988 (on Dutch verbs meaning 'destroy'), works by Divjak and Gries (Divjak and Gries 2006, Gries and Divjak 2009 on Russian verbs meaning 'try'), and Glynn 2010 (on the English near-synonyms *hassle*, *bother*, and *annoy*). Constructional profiling is related to collostructional analysis (Stefanowitsch and Gries 2003, 2005), though the latter approaches the form-meaning relationship from the opposite end, taking the construction as the point of departure and asking what words appear in it. Another related strategy is metaphorical pattern analysis, which examines the metaphorical uses (typically embedded in certain constructions) that near-synonyms can appear in (Stefanowitsch 2006 a and b; Svanlund 2007).

Janda and Solovyev (2009) used constructional profiling to discriminate among near-synonyms for 'happiness' and 'sadness' in Russian, showing that while these nouns selected the same overall set of preferred [preposition + case] constructions (showing that they were indeed close synonyms/antonyms, as opposed to other words that had entirely different sets of preferred constructions), there were stark differences in the distribution of individual preferences within that set of constructions (showing that each synonym/antonym had a unique constructional profile). The Janda and Solovyev study shows that constructional profiles can give us information both about overall similarity of meaning and about fine-grained distinctions in cases of near-synonymy.

The second hypothesis in this study can be restated in terms of synonymy, since an aspectual pair consists of verbs that are lexically synonymous but differ only in aspect. Thus it is reasonable to use constructional profiling to determine whether the overall similarity of *byti* is greater than differences found between the near-synonyms of the paired verbs proposed in hypothesis 2. The fact that Kuznetsova (2013: Chapter 5) has shown constructional profiling to be useful in sorting out the relationships between members of a verb pair is a further argument for using constructional profiles also to look for evidence of the aspectual distinction claimed in hypothesis 2. However, Kuznetsova challenges the famous Maslov (1984) criterion for the identification of aspectual pairs, according to which one expects the perfective and imperfective partners of a pair to be interchangeable in grammatical constructions. Kuznetsova shows that the degree of overlap in constructional profiles between imperfective verbs and their perfective partner verbs is in reality a complex issue presenting a continuum rather than a discrete choice.

3.2.3 Correspondence analysis
A database representing the distribution of grammatical profiles is hard to interpret in its raw form. Correspondence analysis is an effective means of representing this type of data in a meaningful way (Baayen 2008: 128-136). Correspondence analysis is a statistical technique that takes a matrix of data, computes the distances between the rows and the columns in the matrix, and then plots the distances in two dimensions that maximize the amount of variance

that can be accounted for in the data. In other words, the mass of detail in a database can be compressed into a simple map that shows the differences between items much in the way that a road map shows the distances between cities. The grammatical and constructional profiles of *byti* are recorded in detail in the 2,428 lines of the database, corresponding to the number of examples extracted from the PROIEL corpus.

We use correspondence analysis of grammatical profiles to show what the distribution of OCS verbs looks like overall, and then examine the position of *byti* in that distribution. In addition, correspondence analysis is useful to sort out the relationships among the various grammatical constructions that *byti* is found in, supporting the radial category analysis we propose.

3.3 An objective approach to *byti*
All statistical models by necessity impose assumptions on the structure of data, and these limitations often force us to make uncomfortable choices from the start. In the input data, *byti* can be represented either as a single verb with a very rich set of subparadigms, or as two separate verbs with different sets of subparadigms. Clearly, this initial choice will influence the results of the analysis. In order to make our study more objective, we have decided not to settle for a single approach, but rather to use both starting assumptions. In this way we can compare the results and the answer to our question can emerge naturally from the data.

The problem is at its most acute when we want to compare the grammatical profile of *byti* with those of other verbs. Regardless of the starting assumption, we lose some detail, since *byti* has forms that other verbs do not share. We are therefore limited to comparing a subset of *byti*'s subparadigms with those of other verbs. When we carry out comparisons of *byti*'s behavior across different constructions, we have less of a problem. We can represent all of the data and discover which constructions involve subparadigms that present possible contrasts in meaning and/or aspect. These possible contrasts can then be strategically targeted for closer analysis in order to see whether they support a one-verb or a two-verb interpretation.

4. Grammatical profiling – how does *byti* relate to other verbs?
The study of the grammatical profiles of OCS verbs by Eckhoff and Janda (2013) provides a context for evaluating the behavior of *byti*. That study used as input 9,694 verb forms representing 129 verbs in the PROIEL corpus, but excluded *byti* as well as all verbs with less than twenty attestations. The input to the correspondence analysis was the set of grammatical profiles for the 129 verbs. The grammatical profile of each verb is comprised of the number of attested forms for that verb for each of its subparadigms. For example, the verb *tvoriti* 'make' has the following grammatical profile: aorist 0, imperative 14, imperfect 12, infinitive/supine 23, past participle 0, present 99, present participle 26.[5] The output of the correspondence analysis is the plot in Figure 1.

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[5] The *l*-form was excluded from the Eckhoff and Janda (2013) study on the grounds that it was restricted to certain periphrastic constructions; the *l*-form is thus excluded also from the grammatical profiles in section 4, but not from the study of constructions in section 5.

The 129 verbs (which are the rows in the dataset) are printed in small type, while the seven subparadigms (which are the columns in the database) are printed in larger type.[6]
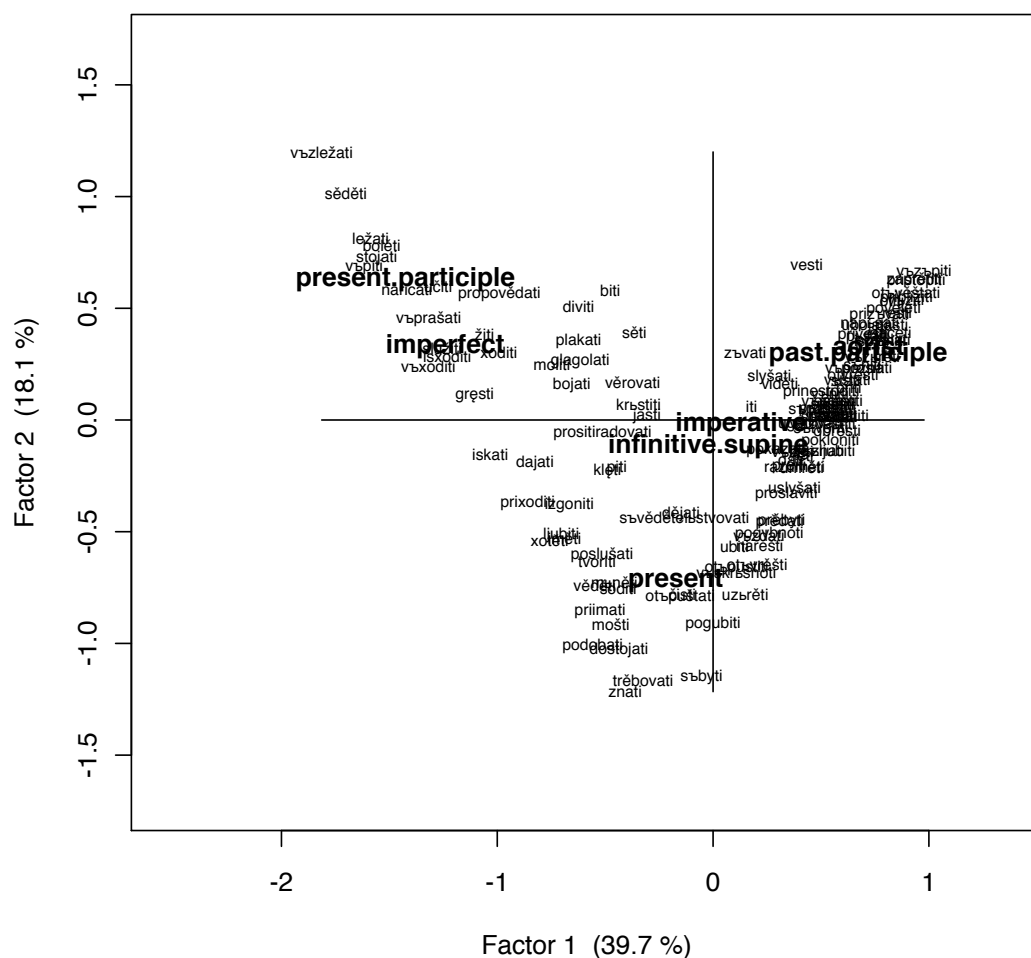

Figure 1: Correspondence analysis of OCS verbs in Janda and Eckhoff 2013

The most important outcome of this analysis is the distribution of verbs according to Factor 1, which concurs with Dostál's (1954) aspectual classification of OCS verbs at the rate of 97%. In other words, given only the distribution of grammatical forms of verbs and asked to plot those verbs, the correspondence analysis yields Factor 1 which accounts for 39.7% of the variance in the data and divides them into two groups (those with negative Factor 1 values vs. those with positive Factor 1 values) that strongly suggest an aspectual distinction. Verbs that Dostál classes as imperfectives such as *vъzležati* 'lie (at table)', *sěděti* 'sit', *vъpiti* 'cry' have negative Factor 1 values, whereas verbs that Dostál classes as perfectives such as *vъzъpiti* 'cry out', *pristǫpiti* 'step up to', *zaprětiti* 'threaten, rebuke' have positive Factor 1 values. This finding gives

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[6] Given the large number of verbs, many are illegible on this diagram. A full list of verbs with their Factor 1 values is available at URL.

compelling support for Dostál's claim that there was an aspectual pair system in OCS, in contrast to scholars who suggest a more recent provenance for aspect in Slavic (Borodič 1953; Růžička 1957; Budich 1969; Bermel 1997; Nørgård-Sørensen 1997).

As mentioned above, *byti* was excluded from the Janda and Eckhoff (2013) due to its unusual contested paradigm and the sheer numbers of its attestations, which presented the danger of skewing the data since nearly one of seven of all verb attestations in OCS are of *byti*. Let us now add *byti* to the correspondence analysis and see what happens. Because we wish to be as objective as possible, we do this in two alternative rounds, representing the two alternative hypotheses: round 1 represents the one-verb hypothesis and round 2 represents the two-verb hypothesis.

4.1 Round 1: *byti* according to the one-verb hypothesis

As we see from section 2.1, scholars who adhere to the one-verb hypothesis identify the *es*-aorist as an imperfect. If we use that designation for the *byti* data and add it to the correspondence analysis, we get the output presented in Figure 2.

Figure 2: Correspondence analysis of OCS with *byti* included according to the one-verb hypothesis

In order to make the data conform to the standards used in Eckhoff and Janda 2013, Figure 2 excludes the attestations of subjunctive forms and *l*-forms of *byti*,

as well as all *bū*-present and *bū*-present participle forms, and merges the *es*-aorist with the *es*-imperfect. Thus 416 *byti* attestations and excluded and 2,307 rows of *byti* data are added to the data on the remaining verbs. Under this analysis, *byti* emerges as a rather garden-variety imperfective verb with a Factor 1 value of -0.5. Its nearest neighbors include the states *ljubiti* 'love', *xotěti* 'want', *iměti* 'have', as well as activities such as *poslušati* 'obey', *tvoriti* 'make', and *sъvědětelьstvovati* 'witness'. In other words, when we look at the meanings of the neighboring verbs, this plot makes a lot of sense, suggesting that *byti* can be felicitously interpreted as a single imperfective verb.[7]

4.2 Round 2: *byti* according to the two-verb hypothesis
If we instead split *byti* into two verbs, we get a different result. Under this assumption, we have: an *es*-stem verb with present, present participle, imperfect and aorist subparadigms; and a *bū*-stem verb with present, present participle, aorist, past participle, infinitive, and imperative subparadigms. The subjunctive must still be excluded, since no other verb has a subjunctive form. The plot resulting from the correspondence analysis appears in Figure 3.

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[7] An alternative, also compatible with the one-verb hypothesis, is to argue that *byti* belongs to a small residue of aspectually neutral verbs, as argued by Eckhoff and Haug (ms.). Most verbs exclude either the aorist + past participle or the imperfect + present participle, or are very strongly skewed in the distribution of these forms. Eckhoff and Haug find that, along with *byti*, there are only forty-two OCS verbs for which both types of forms are well attested, among them verbs like *biti* 'beat', *věrovati* 'believe', *dělati* 'do'.
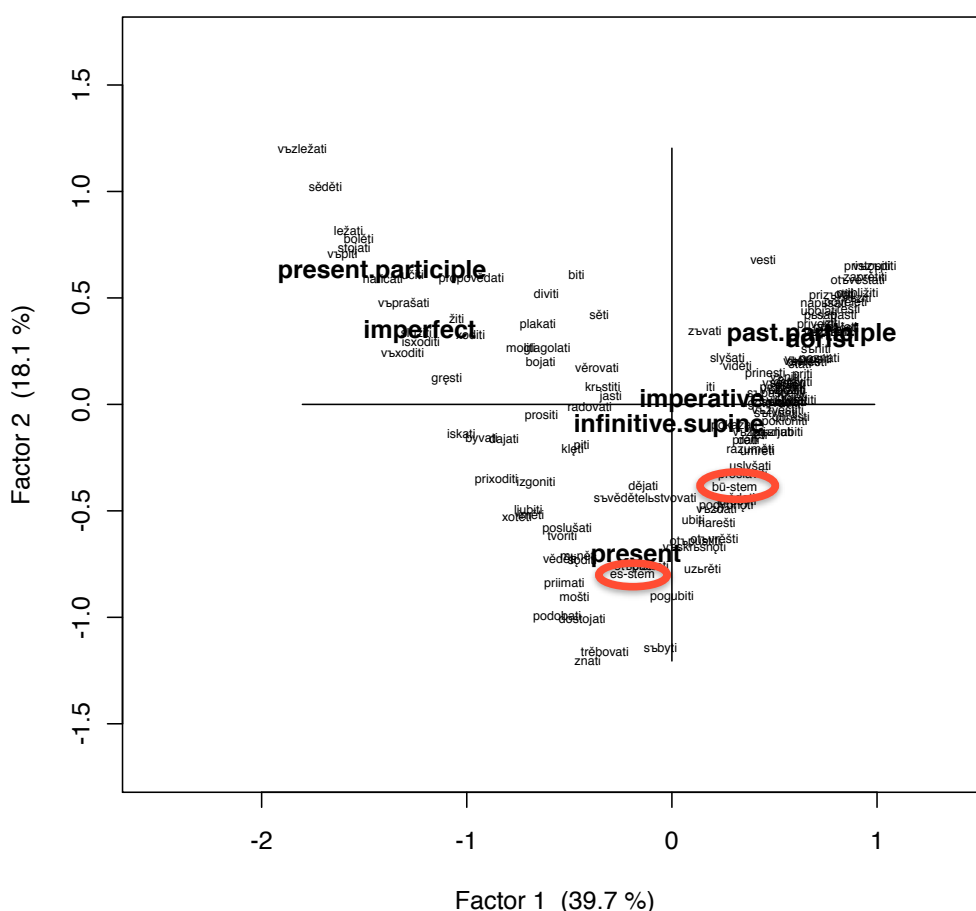
Figure 3: Correspondence analysis of OCS with *byti* included according to the two-verb hypothesis

In this analysis, *byti* does indeed appear to split apart into two verbs, with the *es*-stem landing with other imperfective verbs in the negative zone for Factor 1, and the *bū*-stem landing among perfective verbs in the positive zone. This would seem to support van Schooneveld's argument and thus also hypothesis 2. Alternatively one could argue that this split is an artifact of the way in which the data was manipulated, segregating the subparadigms as described above. Furthermore, the split brings with it some inconvenient problems. If we have two verbs, one of them is rather strange: the *es*-stem verb lacks an infinitive, imperative, and past participle, and has a defective imperfect subparadigm. These deficits are not due to lack of attestation, but are caused by our very definitions of these verbs. The split also assumes that the morphological identity of forms gives them a correct classification, which is clearly controversial for at least two of the subparadigms. Does it really make sense to class the *bū*-stem present as a (perfective) present, or should it be accorded special status as a future tense? Is the *es*-aorist really an aorist and is it really semantically distinct from the *es*-imperfect?

4.3 Summary of correspondence analysis

Another interesting fact about both the one-verb analysis in round 1 and the two-verb analysis in round 2 is that even though we have added a large portion of data to the calculations (*byti* adds nearly 24% more data), the outcome for the other verbs is barely perturbed. It is theoretically possible to model *byti* as either a single verb or as a verb pair, but correspondence analysis alone is not sufficient to resolve the controversy between our two hypotheses. The input data was impoverished in the sense that all subjunctive, *l*-forms, *bū*-present, and *bū*-present participle forms were excluded. The two-verb analysis suffered from the proposal of a verb lacking forms that are otherwise not absent from verbal paradigms. Both analyses are unable to directly address the status of the *es*-aorist and the *bū*-present and contrast their behavior with their purported counterparts (the *bū*-aorist and the *es*-present), or to assess the behavior of the shared forms (the infinitive, imperative, and *l*-form). In order to examine *byti* in more detail, we turn to a constructional profiling analysis.

5. Constructional profiling

We use the constructional data to further explore the one-verb vs. two-verb hypotheses. The analysis enables us to discover whether forms purportedly belonging to a particular stem are specialized with respect to individual constructions. We provide a comprehensive description of the constructions in which *byti* occurs, and use a statistical approach to measure the relationships among constructions with respect to the distribution of subparadigms in each construction.

Because we restrict our focus to *byti* in this section, there is no need to exclude any data in order to conform with the paradigms of other verbs as in Section 4. Therefore all of the *byti* data (including subjunctive and *l*-forms) is included.

We will first use objective means to define and group constructions and then go deeper by breaking down *byti*'s behavior by construction. We will then proceed construction by construction to address the issues unresolved in the correspondence analysis in section 4. For each construction, we will focus on the behavior of both the shared forms and the possible contrasts.

If *byti* is indeed a verb pair, we would expect there to be at least some constructions in which the competing "duplicate" aorist and present forms could both occur, and that they should show aspectual contrast in those constructions, as per the Maslov criterion. In other words, we would expect to find some overlap in the constructional profiles of the *es*-stem and the *bū*-stem, and this expectation is borne out by the facts. While Kuznetsova (2013: Chapter 5) has shown that the degree of overlap in the constructional profiles of aspectually paired verbs in Modern Russian can vary greatly, her study does not deny that there is aspectual contrast in the constructions where overlap is observed.

5.1 Extracting constructions

We did not want our construction inventory to be based on a priori assumptions or individual examples, but rather to let the constructional patterns emerge from the data. We therefore arrived at a set of constructions by aggregating information from several annotation layers in the PROIEL corpus to find

patterns.[8] In order to arrive at these patterns, we used syntactic and part-of-speech information from the annotation and further hand-sorted examples. Syntactic information included the function of *byti* as an auxiliary, a matrix verb or a dependent verb form, along with argument structure information, including presence/absence of oblique arguments, predicative complements and adverbials, augmented by information on the part of speech and case marking appearing on the arguments. Further hand sorting made it possible to separate personal from impersonal constructions and to group constructions with similar patterns. This process, which relied upon the objective features of the *byti* data, yielded ten constructions and unsurprisingly these largely match the kind of constructions usually associated with 'be' verbs cross-linguistically. Thus our construction inventory is based on the PROIEL syntactic analysis and morphological information, not on semantic analysis, although we use semantic labels for mnemonic reasons. In this section we present an overview of the ten constructions, which will be analyzed in greater detail in subsections 5.3 through 5.7. The frequency of the constructions in the dataset is visualized in Figure 4.

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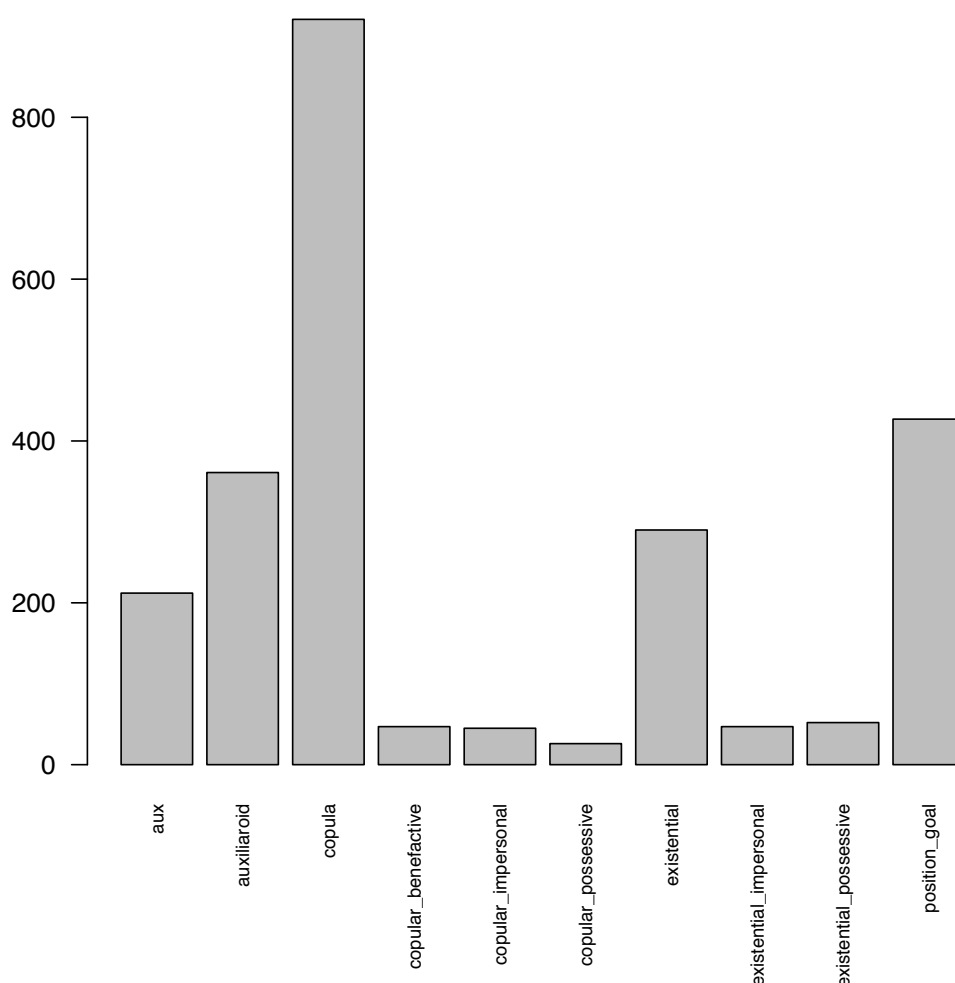
[8] For full documentation on the PROIEL syntactic analysis, see http://folk.uio.no/daghaug/syntactic_guidelines.pdf

Figure 4: Frequency of the ten constructions in the dataset

5.1.1 Auxiliaries (aux) and possible auxiliaries (auxiliaroid)
The only usage recognized as a "proper" auxiliary in the PROIEL analysis is the use of *byti* in forming perfect tenses with the *l*-form (example 1). We isolated this group under the label AUXILIARY. There were 212 such occurrences in the dataset.

(1)   *pravě sǫdilъ esi*
         'you have judged rightly' (Mar. Luke 7:43)

There are, however, uses that superficially resemble auxiliaries: *byti* is used with passive participles (example 2), and also in a construction with the present active participle (example 3) that could be interpreted as a progressive. Since we do not know a priori whether these uses belong with the AUXILIARY, we have assigned them to a separate construction group labeled AUXILIAROID. There were 361 such occurrences in the dataset.

(2)   *pisano estъ*
         'it is written' (Mar. Matt. 21:13)

(3)   *bě učę vъ crkve*
         'he was teaching in the temple' (Mar. Luke 19:47)

5.1.2 Copulas
We found four main patterns that serve as variations on a basic copula construction. The COPULA construction is the most frequent pattern in the entire dataset, with 921 occurrences. The label is given to regular, personal constructions with a predicative complement, which may be a noun (example 4), an adjective (example 5), or a clause.

(4)   *snъ tvoi živъ estъ*
         'your son is alive' (Mar. John 4:50)

(5)   *vy este solь zemi*
         'you are the salt of the earth' (Zogr. Matt. 5:13)

The COPULAR POSSESSIVE pattern is like the COPULA pattern, but also includes a nominal in the dative analyzed as an oblique argument, which is the convention for constructions meaning 'have X as Y', 'be X's Y' (example 6). There are 26 such occurrences in the dataset.

(6)   *kako emu estъ synъ*
         'how can he be his son?' (Mar. Luke 20:44)

The COPULAR BENEFACTIVE pattern is like the COPULA pattern, but includes a dative nominal analyzed as an adverbial (example 7). These occurrences usually have an infinitive or clause as the subject, and the dative is clearly benefactive. There are 47 such occurrences in the dataset.

(7)   *uněe estъ vamъ da azъ idǫ*
        'it is better for you that I should go' (Mar. John 16:7)

The COPULAR IMPERSONAL pattern is like the COPULA pattern, but has no referential subject (example 8). This analysis was used for properties ascribed to the topic time – 'it was morning', 'it became late' and similar constructions. There were 45 such occurrences.

(8)   *bě že noštъ*
        'it was night' (Mar. John 13:30)

5.1.3 Existentials

This group of constructions lacks a predicative complement. The most common construction in this group is the EXISTENTIAL, with 290 occurrences, where *byti* has a referential subject and often one or more adverbials (examples 9-11). *Byti* in this pattern means 'exist' (example 9), 'come into being', 'happen', or even 'come' (example 10). The pattern also includes presentational 'be' (example 11).

(9)   *vъ domu otca moego obitěli mъnogy sǫtъ*
        'in my father's house there are many rooms' (Mar. John 14:2)

(10)   *glsъ bystъ iz oblaka*
        'a voice came from on high' (Mar. Luke 9:35)

(11)   *bě člvěkъ tu*
        'there was a man there' (Mar. Luke 6:6)

The EXISTENTIAL POSSESSIVE construction has the same basic structure, but also includes a dative nominal analyzed as an oblique argument (example 12). This analysis was chosen in the PROIEL annotation to indicate the typical Indo-European *mihi est* 'I have' predicative possessive construction. There were 52 such occurrences.

(12)   *ne bě ima čęda*
        'they had no child' (Mar. Luke 1:7)

In the EXISTENTIAL IMPERSONAL construction *byti* has no referential subject, but frequently an adverbial or a complement clause (example 13). The construction has a strong correlation with the Greek *egeneto* 'it happened' construction.[9] There are 47 such occurrences in our dataset.

(13)   *i bystъ egda sěaše*
        'and it happened as he was sowing' (Mar. Mark 4:4)

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[9] The Greek correspondence for example (13) is:
     kai egeneto en tōi speirein
     and happen.aor.3sg in the.n.dat.sg sow.prs.inf
     'and it happened as he was sowing'

5.1.4 *Byti* as a positional verb

Our final construction is POSITION/GOAL, which involves personal occurrences of *byti* with prepositional phrases or adverbs, usually indicating position, source, or goal (examples 14-15). In these occurrences *byti* has a behavior reminiscent of position verbs (like *sit, stand*), or even motion verbs.[10] The construction is very common with 427 occurrences.

(14)   *otcъ moi iže estъ na nebesьхъ*
        'my father who is in heaven' (Mar. Matt. 16:17)

(15)   *něstъ sъde*
        'he isn't here' (Mar. Mark 16:6)

5.2 Grouping constructions according to the grammatical profiles of *byti*

Our next task is to make comparisons across the constructions in order to test our two hypotheses. If the one-verb hypothesis is correct, although we may find variation across the constructions, it should be possible to relate them to each other in a radial category network that reflects the syntactic behavior and semantic expression of *byti* in a holistic way, with core uses closely associated with each other, and less prototypical uses at the periphery. If the two-verb hypothesis is correct, we should find evidence of more dispersion. On the one hand, we can expect that there might be some constructions that are strongly or exclusively used for only one of the stems, given that there is evidence of such specialization among aspectually paired verbs in Russian (Kuznetsova 2013: Chapter 5). On the other hand, we also expect some constructions to be used by both stems, and in such cases the forms of the two stems should be used contrastively as imperfective vs. perfective verbs.

We test the two hypotheses by comparing the grammatical profiles of *byti* across the ten constructions. This makes it possible to plot the relationships among the constructions and also to target constructions where there is potential for contrastive overlap in use of *es-* and *bū-*forms. This study includes all of the attestations of *byti* in arranged according to the following subparadigms:

- From the *es*-stem: *es*-present, *es*-present participle, *es*-imperfect, *es*-aorist, subjunctive
- From the *bū*-stem: *bū*-present, *bū*-present participle, *bū*-aorist, past participle, *l*-form, infinitive, imperative[11]

With the grammatical profile of *byti* for each of the constructions as input, we can use correspondence analysis to discover the relationships among the constructions. The resulting plot is presented in Figure 5.

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[10] In the PROIEL analysis, these prepositional phrases and adverbs were conflated with regular predicative complements for the sake of simplicity.
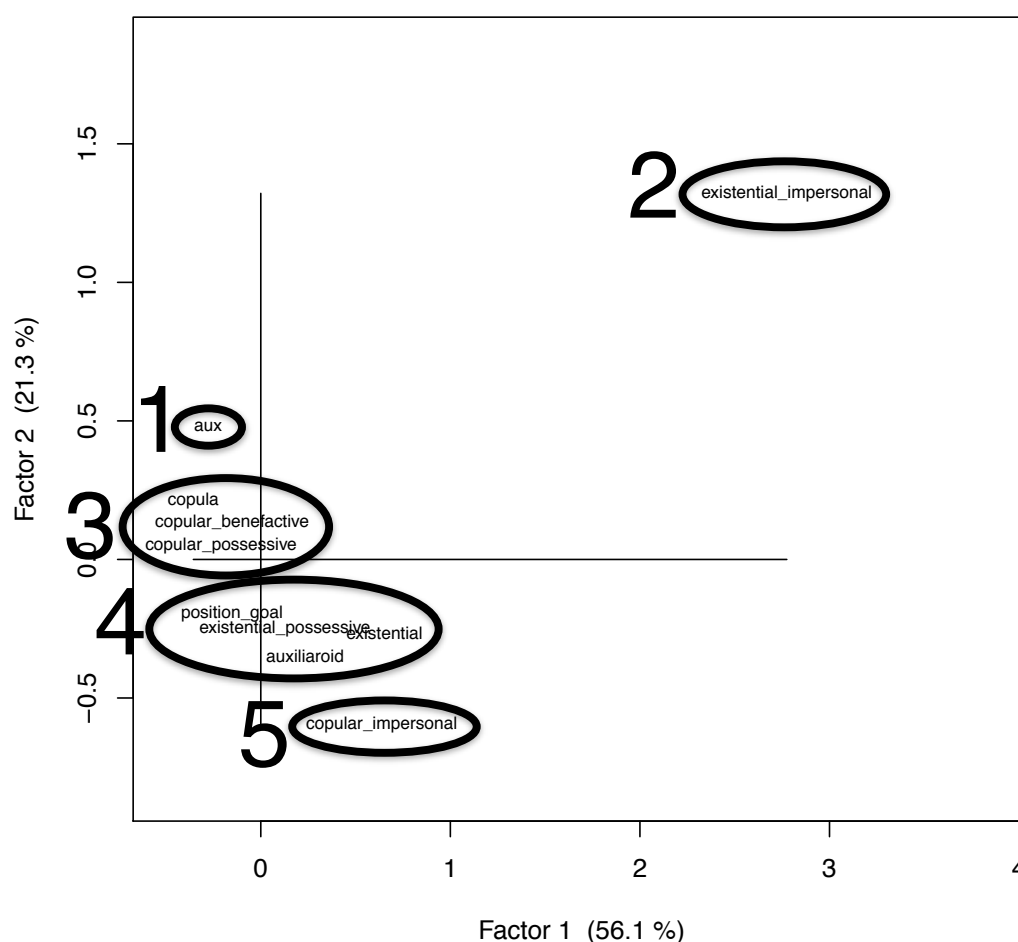[11] The *bū*-imperfect was not attested in our dataset.

Figure 5: Correspondence analysis of *byti* constructions by grammatical profile

The plot in Figure 5 has been adjusted by removing the subjunctive from the calculation. The reason for doing so is that 96% of all examples of subjunctive forms are found in the AUXILIARY construction,[12] and including the subjunctive skewed the plot, causing nearly all of the other constructions to be lumped together. By removing the subjunctive from the plot we make it possible to see the relationships among the remaining constructions, but we must remember that this plot has been distorted and that the AUXILIARY construction is in fact the one that is most different from the others. The subjunctive is, however, included in our study and represented in the grammatical profile of *byti* for the constructions in sections 5.3-5.7. Inspection of the results suggests that Factor 1 in the correspondence analysis largely reflects the relative frequency of the *bū*-aorist (the only form in the grammatical profile for the EXISTENTIAL IMPERSONAL

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[12] There are 96 examples of subjunctive forms in total, 92 are in the AUXILIARY construction, 3 are in the AUXILIAROID construction, and one is in the EXISTENTIAL construction.

construction, which has the highest Factor 1 value; see section 5.4) as opposed to all other subparadigms.[13]

 Five groups of constructions emerge from the correspondence analysis, listed in Table 4 together with their frequencies. This table breaks down the distribution according to *es*-stem, *bū*-stem, and shared forms (see Table 1). The percentages add to 100% in each row.

group	construction	es-stem	percent	bū-stem	percent	shared forms	percent
Group 1	auxiliary	203	95.8%	9	4.2%	0	0%
Group 2	existential impersonal	0	0%	47	100%	0	0%
Group 3	copula	746	81.0%	121	13.1%	54	5.9%
	copular possessive	22	84.6%	4	15.4%	0	0%
	copular benefactive	28	59.6%	15	31.9%	4	8.5%
Group 4	copular impersonal	22	48.9%	23	51.1%	0	0%
Group 5	existential	124	42.8%	147	50.7%	19	6.6%
	existential possessive	22	42.3%	24	46.2%	6	11.5%
	auxiliaroid	201	55.7%	134	37.1%	26	7.2%
	position/goal	326	76.3%	77	18.0%	24	5.6%

Table 4: Grouping of OCS byti constructions and distribution of forms

Groups 3 and 5, which are adjacent to each other, form the core of the distribution, both in terms of their relative placement and their frequency; each of these groups accounts for more than 40% of the total data. In terms of their profiles, the *es*-present is the most frequent form in both groups 3 and 5, followed by the *bū*-present and *es*-aorist. Only 12.5% of the data is distributed across the three more peripheral constructions in groups 1, 2, and 4. Of the three peripheral constructions, the most idiosyncratic are the AUXILIARY construction (with a most of the attestations split between the *es*-present and the subjunctive) and the EXISTENTIAL IMPERSONAL (for which the *bū*-aorist comprises all of the data).

 The AUXILIARY and EXISTENTIAL IMPERSONAL are by far the most distinct constructions in terms of grammatical profiles. Apart from that, we see several expected groupings: most of the copular constructions constitute a group, and so do the personal existential construction variants (but not the EXISTENTIAL IMPERSONAL). What is less expected, however, is that the POSITION/GOAL construction does not group with the copular constructions, but lands in a middle position closer to the existentials. Even more unexpected is the fact that the AUXILIAROID construction is not at all similar in grammatical profile to the AUXILIARY construction – in fact it groups with the personal existentials. It is also

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[13] Factor 2 in Figure 5 is harder to interpret. There seems to be some influence of tense involved, and perhaps some relationship to stative vs. change of state readings (note the correspondence to the forms at the top and bottom of Table 2), but this is inconclusive and not very relevant to our analysis.

interesting to note that the COPULAR IMPERSONAL construction appears to be much more similar to the personal existentials than to the other copular constructions.

The correspondence analysis plot in Figure 5 can be interpreted as a radial category of *byti* constructions, with a prototype vs. periphery structure. The prototypical high-frequency uses of the copular constructions in group 3 and the EXTISTENTIAL, POSITION/GOAL and AUXILIAROID uses in group 5 are central in this structure. Groups 3 and 5 thus form the conceptual core of *byti*'s radial category. The AUXILIARY and impersonal uses in groups 1, 2, and 4 are at the periphery. This outcome supports the one-verb hypothesis in that it yields a mostly coherent center-periphery structure rather than a patchwork of items. However, it is still possible that we will find evidence in favor of the two-verb hypothesis, so it is necessary to look more deeply at the constructions.

In the following subsections, we examine the five construction groups with respect to the grammatical profile of *byti* and the light this may shed on our two hypotheses. We are particularly interested in finding whether any construction has specialized to use with one of the stems as opposed to the other, and whether there is evidence of contrast in constructions where the "duplicate" forms are represented.

In each of the following subsections we present a graph of the grammatical profile of *byti* in the given construction or group of constructions (see Figures 6-10). The bars on the graph are arranged to reflect the stems and morphological subparadigms as given in Table 1. The first five bars from the left represent the subparadigms particular to the *es*-stem: *es*-present, *es*-imperfect, *es*-aorist, *es*-present participle, and subjunctive. The next three bars represent the subparadigms particular to the *bū*-stem: *bū*-present, *bū*-aorist, *bū*-present participle. The remaining four bars represent the "shared" forms, all of which have the *bū*-stem: *bū*-past participle, imperative, infinitive, and *l*-form. In order to show all the grammatical profiles on the same scale, the y-axis for each graph is the percentage of forms in the profile. For example, Figure 6 shows that the *es*-present and the subjunctive each account for over 40% of the forms of *byti* in the AUXILIARY construction, with the remainder of the profile distributed across the *es*-imperfect, *es*-aorist, and *bū*-aorist.

5.3 The AUXILIARY construction

The use of *byti* as an auxiliary to *l*-forms turns out to be the most distinct construction of all. Its main differentiating feature is the use of subjunctive forms, but even when we exclude this subparadigm (as in Figure 5), this construction is clearly set apart from the others.
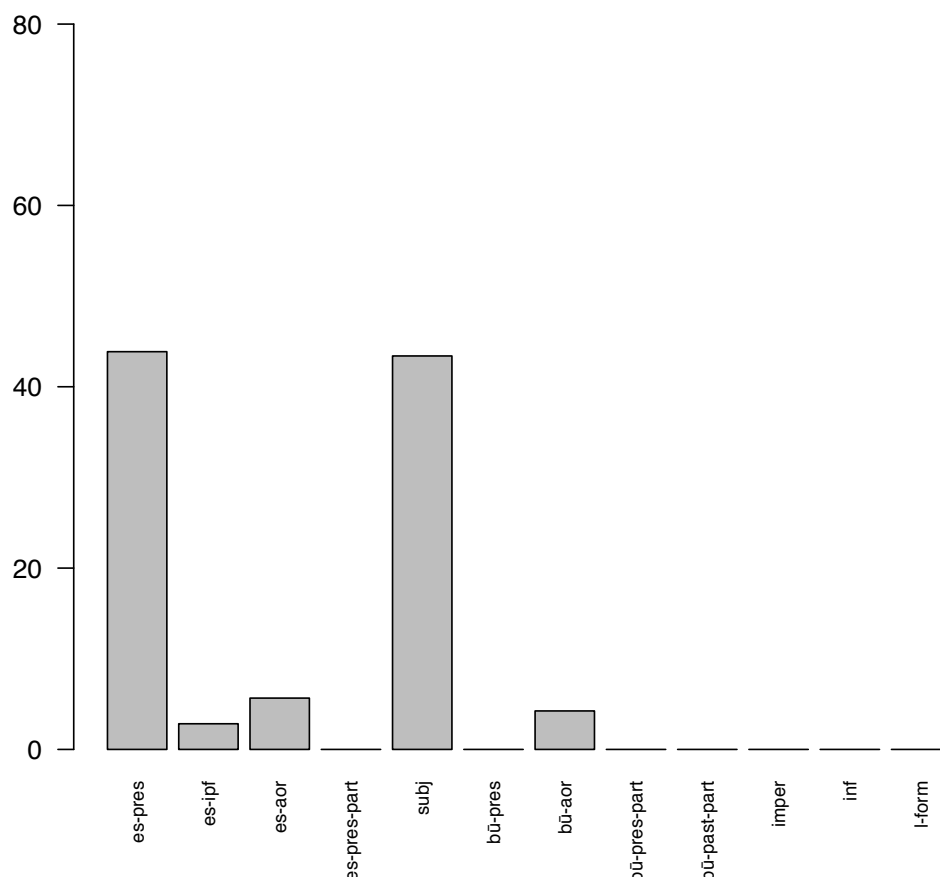
Figure 6: Grammatical profile of *byti* in the AUXILIARY construction

With regard to our two hypotheses, it is particularly interesting to note that the AUXILIARY's grammatical profile is limited almost exclusively to *es-* stem forms – the construction is not even attested with infinitives, *l*-forms or imperatives in our dataset, the "shared" *bū*-stem forms that are clearly not strongly tied to any particular aspectual meaning.[14] The only exceptions are nine examples of the *bū*-aorist. However, these aorists appear to have the same function as the subjunctive form *bim, bi …* with which they sometimes even co-occur (example 16). Note that most examples are third person singular aorists with the form *by.* The usual third singular *bystъ* form of the aorist does not occur in this construction in our dataset.

(16)   *ašte otъ sego mira bi bylo cstvo moe. slugy ubo moję podvizaly sę **byšę**. da ne prědanъ bimь ijudĕomъ*
       'If my kingdom were of this world, my servants would have been fighting, that I might not be delivered over to the Jews' (Mar. John 18:36)

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[14] But note that attestations with *bū*-present forms are found as auxiliaries in Old Russian.

The AUXILIARY construction occurs with both the *es*-imperfect and the *es*-aorist. However, they seem semantically indistinguishable, and are in near-perfect complementary distribution, as shown in Table 5. A similar distribution is found also for the group 5 constructions, but not for group 3.

	es-imperfect	*es*-aorist
3sg	0	11
3pl	6	1

Table 5: Person and number distribution of *es*-imperfect and *es*-aorist in the AUXILIARY construction.

The single third person plural attestation of the *es*-aorist (example 17) is found in exactly the same context as one of the third person plural *es*-imperfect attestations (example 18).

(17) *jęže **běaxǫ** prišъly sъ nimь*
        who be.ES-IMPF.3pl come with him
        'those who had come with him' (Mar. Luke 23:55)

(18) *iže **běšę** sь nejǫ prišli*
        who be.ES-AOR.3PL with her come
        'those who had come with her' (Supr. 3)

Thus, we see that the AUXILIARY construction is in sharp contrast with the other constructions. With its strong preference for *es*-forms, the AUXILIARY makes the strongest claim for the existence of a separate *es*-verb. The few attestations of the *bū*-aorist in this construction appear to be in free variation with the subjunctive, and the distribution of the *es*-imperfect and the *es*-aorist suggests a close relationship between these two subparadigms, confirming the view that they functioned as a unit (see section 2.1).

5.4 The EXISTENTIAL IMPERSONAL construction
This construction is also clearly distinct from all other constructions. As shown in Figure 7, the EXISTENTIAL IMPERSONAL construction occurs exclusively with the *bū*-aorist in our dataset (example 19).

(19) *i **bystъ** egda sъkonьča isъ pritъčę siję.*
        'And it came to pass when Jesus had finished these parables' (Mar. Matt. 13:53)
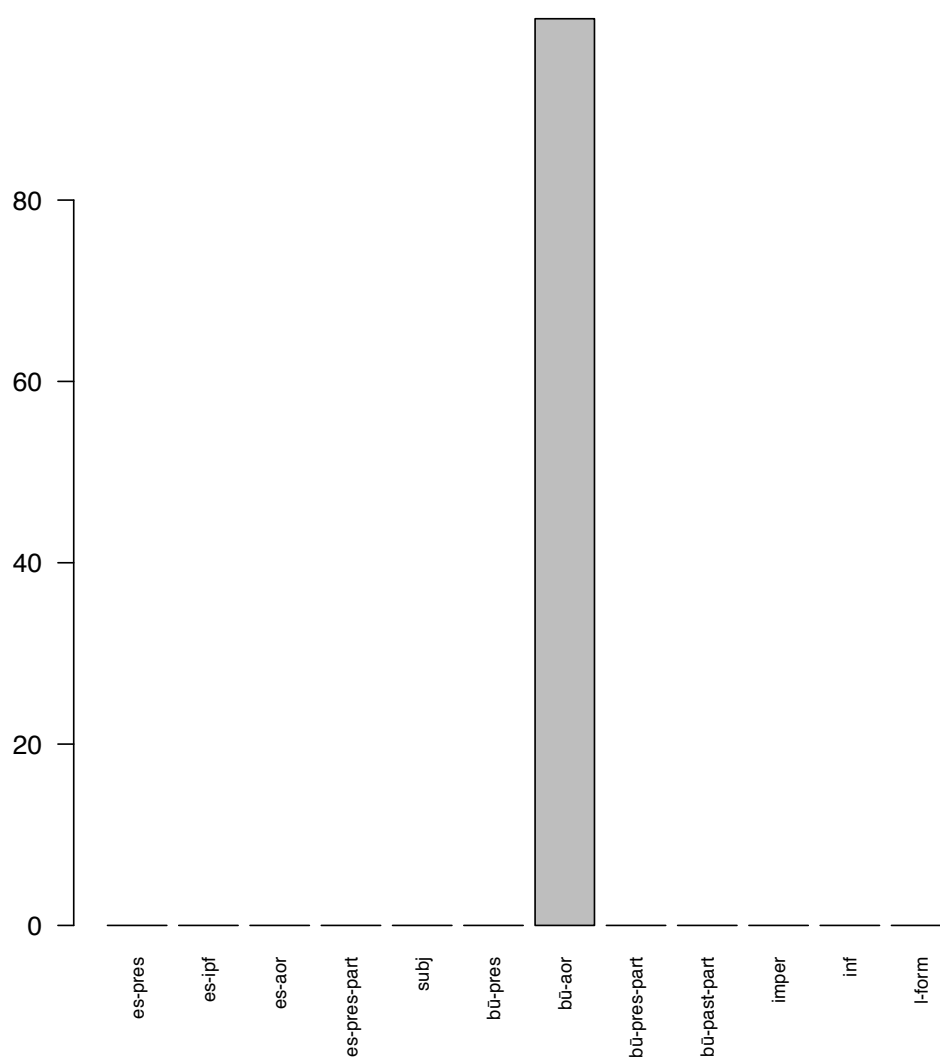
Figure 7: Grammatical profile of *byti* in the EXISTENTIAL IMPERSONAL construction

Among the ten constructions *byti* appears in, this construction makes the strongest case for the existence of a separate *bū*-stem verb.

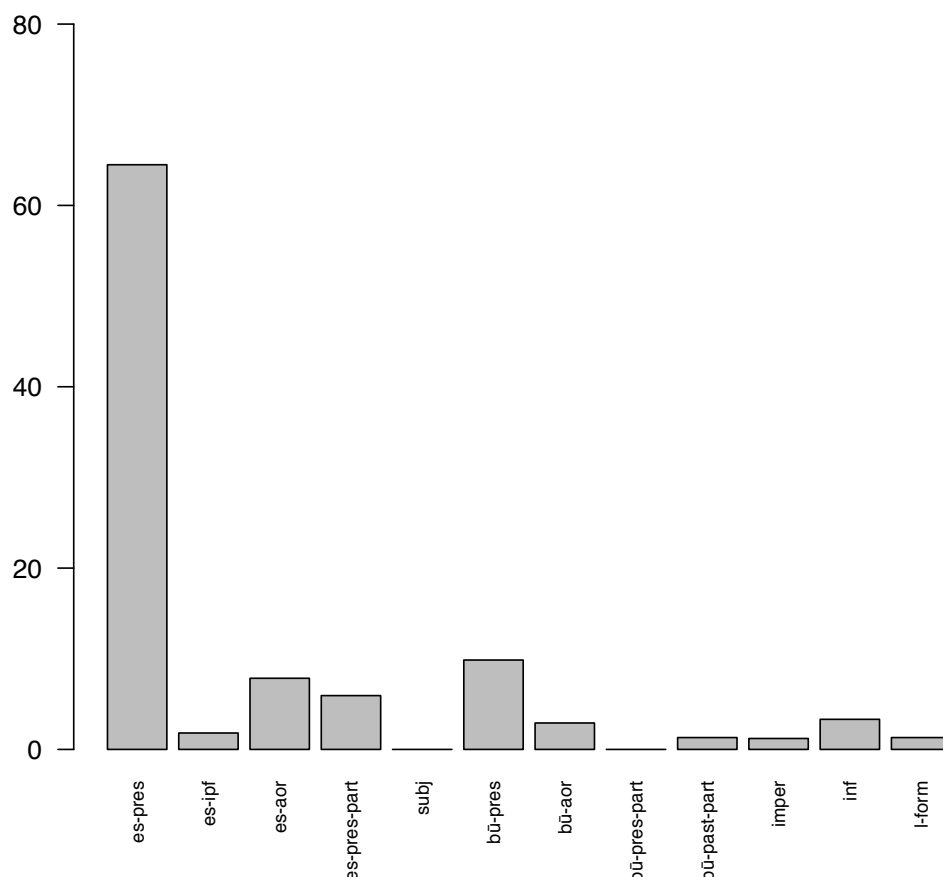**5.5 Personal copular constructions**

Figure 8: Combined grammatical profile of *byti* in the personal copular constructions

The COPULA, COPULAR POSSESSIVE and COPULAR BENEFACTIVE constructions are very different from the two previous constructions in that nearly all forms of both stems are represented in the grammatical profile, although it is dominated by the *es*-present subparadigm. These results do not strongly support the two-verb hypothesis.

Let us first turn to the *bū*-present attestations. If the *bū*-present is really a perfective present, we expect it to have a change-of-state meaning. However, the distribution of Greek source lemmata does not support this interpretation. The majority of attestations (54) translate the stative *eimi* rather than the change-of-state *gignomai* (18 attestations).[15] When we examine the examples more closely, we find that the *eimi* translations are either clearly stative (20) or ambiguous.

(20)   *i ašte ubo bǫdetъ domъ dostoinъ. pridetъ mirъ vašъ na nь*

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[15] The R script available at our website prints out all the OCS examples of *eimi* and *gignomai* translations.

'And if the house be worthy, your peace will come upon it' (Mar. Matt. 10:13)

The *gignomai* translations, on the other hand, include both clear change-of-state attestations (21), as well as a number of ambiguous ones.

(21)   *ašte snъ esi bžii rьci kameniju semu da bǫdetъ xlěbъ*
        'If you are the son of God, tell this stone to become bread' (Mar. Luke 4:3)

The examples therefore suggest that, at least in this construction, the *bū*-present subparadigm is not a perfective present, but rather an aspectually neutral future tense form that can express both states and changes of state.

	es-imperfect	*es*-aorist
3sg	8	62
3du	6	3
3pl	4	7

Table 6: Distribution of *es*-imperfect and *es*-aorist in the personal copular constructions

In this group of constructions we also find both the *es*-imperfect and the *es*-aorist. As we see in Table 6, these forms contrast in third person singular, dual and plural. In other words, there is no clear division of labor as observed for the AUXILIARY construction and the group 5 constructions. This is the only place were we might find an aspectual contrast that could support the two-verb hypothesis. The *es*-imperfect examples generally provide background information and explanations to a past-tense narrative (example 22).

(22)   (Jesus saw Peter and Andrew casting nets into the sea)
        ***běašete** bo rybarě*
        'for they were fishermen' (Mar. Mark 1:16)

However, we find exactly the same kinds of examples with the third person *es*-aorist examples.

(23)   (But the boat by this time was a long way from the land, beaten by the waves)
        ***bě** bo protivenъ větrъ*
        'for the wind was against them' (Mar. Matt. 14:24)

Since there are more *es*-aorist attestations, there is naturally also a greater variety of examples, including examples where *byti* denotes a delimited past state.

(24)   (You should rejoice)
        *ěko bratrъ tvoi sь mrъtvь **bě** i ožive*
        'because your brother was dead and has come back to life' (Mar. Luke 15:32)

Such a delimitative reading is not uncommon with simplex imperfective (or neutral) verbs in the aorist (Eckhoff & Haug ms.). We have no such examples with the *es*-imperfect in our dataset, so there is the possibility that this may be a real semantic difference between the two subparadigms in the COPULA construction. There is, however, no indication that the *es*-imperfects indicate simultaneity while the *es*-aorists do not, as van Schooneveld claims. At best we can only say that the results are inconclusive and there is no consistent contrast here.

	eimi 'be'	*gignomai* 'become'
imperative	3	4
infinitive	15	7
l-form	8	0

Table 7: Greek source lemmas of imperatives, infinitives and *l*-forms in personal copular constructions

The infinitives and imperatives translate both Greek *eimi* 'be' and *gignomai* 'become', whereas the attested *l*-forms translate only *eimi* (Table 7). This suggests that these forms do not have a consistent aspectual preference in this construction, and that stative readings are very common despite the *bū*-stem origins of these forms (25).[16]

(25)   *kako gljǫtъ edini xa **byti** sna dva*
         'How is it that they say the Christ is David's son?' (Mar. Luke 20:41)

All in all, the behavior of *byti* in the personal copular constructions mostly suggests that it is a single verb. However, it is possible that the *es*-aorist may have readings that the *es*-imperfect lacks in this construction, and this could entail some contrast between the *bū*-aorist and the *es*-aorist.

5.6 The COPULAR IMPERSONAL construction
As seen in Figure 5, the COPULAR IMPERSONAL construction does not group with the other copular constructions at all, but rather with the existentials. The most striking feature of the grammatical profile of the COPULAR IMPERSONAL construction is that the dominant subparadigm is the *es*-aorist – this appears to be what separates it both from the copular constructions and the existentials. Moreover, there are no *es*-imperfect forms. We should be cautious in attaching too much weight to this, however, since the pattern is not very frequent; there are only fifteen *es*-aorist attestations of this construction.

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[16] The Greek correspondence for example (25) is:
         pōs legousin ton Khriston einai Daueid huion
         how say.prs.3pl the.m.acc.sg Christ.acc.sg be.prs.inf David.gen.sg son.acc.sg
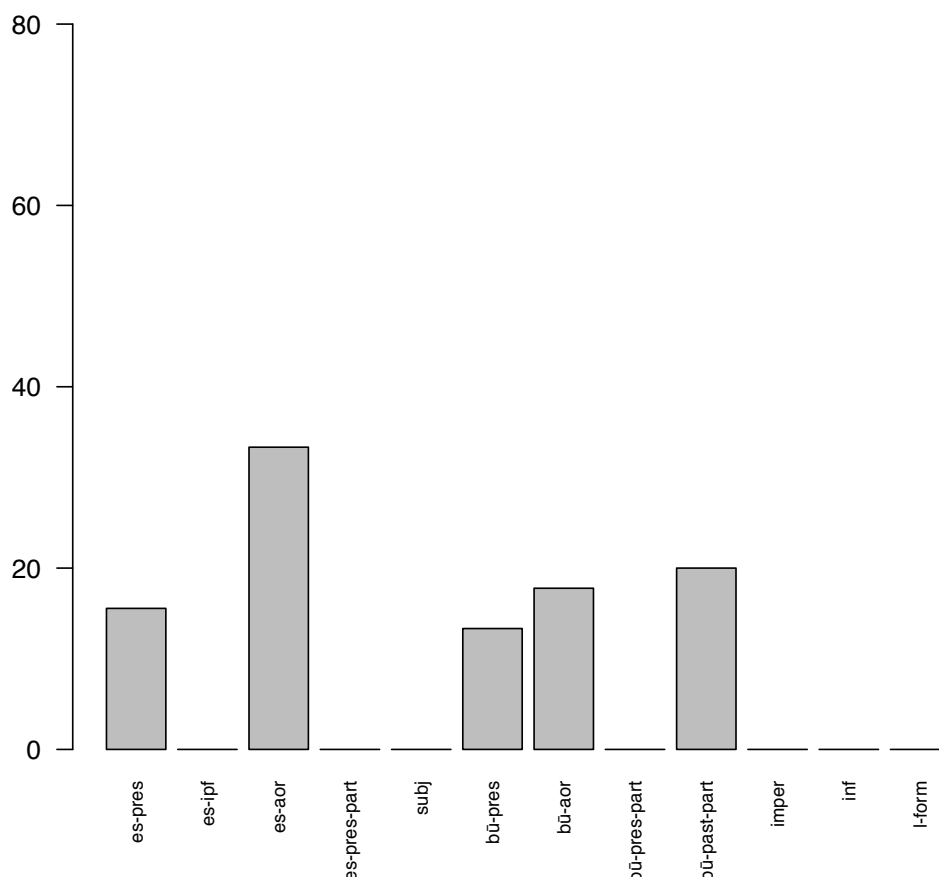   'How can they say that the Christ is David's son?'

Figure 9: Grammatical profile of *byti* in the COPULAR IMPERSONAL construction

The subparadigms represented in the grammatical profile are *es*-present, *bū*-present, *es*-aorist and *bū*-aorist, in nearly equal proportions, and also the *bū*-past participle. It is tempting to think of this as support for the two-verb hypothesis. However, we find that the *bū*-present attestations predominantly translate Greek *eimi* (six *eimi* attestations, only one *gignomai* attestation), which indicates that in this construction, as we saw in the personal copular construction group, the *bū*-present subparadigm is not a perfective present, but regularly expresses states in the future (example 26).

(26)   *tako bǫdetъ vъ sъkonьčanie věka*
       'thus it will be at the end of time' (Mar. Matt. 13:49)

Thus, the grammatical profile of this construction does not particularly support the two-verb hypothesis. It is, however, our only example of the *es*-aorist apparently specializing with a construction at the expense of the *es*-imperfect.

5.7 Existential constructions, position/goal and auxiliaroids

As we saw in Figure 5, the AUXILIAROID pattern (*byti* in passive and progressive constructions) turns out to have a grammatical profile very different from that of the AUXILIARY construction, but remarkably similar to that of the group of personal existential constructions. Likewise, the POSITION/GOAL construction turns out to group with the personal existentials rather than with the personal copular constructions. The grammatical profiles of these constructions are similar to the group of personal copular constructions in that the *es*-present is generally the most frequent subparadigm, but *bū*-aorists, *bū*-presents and *es*-aorists are also well represented in this group.
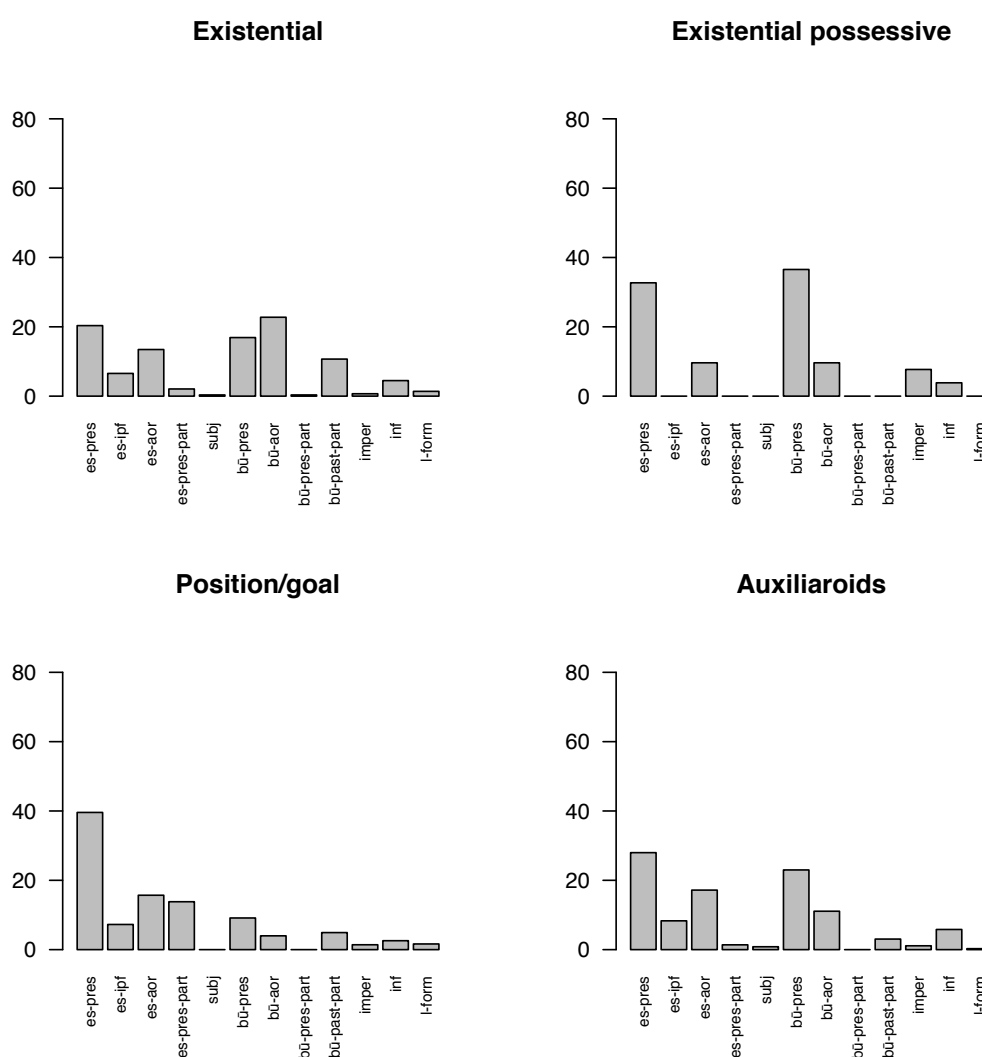

Figure 10: Grammatical profiles of *byti* in the EXISTENTIAL, EXISTENTIAL POSSESSIVE, AUXILIAROID and POSITION/GOAL constructions

	eimi 'be'	*gignomai* 'become'
EXISTENTIAL	24	20
EXISTENTIAL POSSESSIVE	12	4
AUXILIAROID	21	3
POSITION/GOAL	29	5

Table 8: Greek source lemmas for *bū*-present attestations of EXISTENTIAL, EXISTENTIAL POSSESSIVE, AUXILIAROID and POSITION/GOAL constructions.

Again the distribution of Greek source lemmas suggests that the *bū*-present has both stative and change-of-state readings and is thus not a straightforward perfective present in these constructions either. However, we also see that while the AUXILIAROID and POSITION/GOAL constructions have a preference for the stative *eimi* (example 27), the EXISTENTIAL construction has fairly equal shares of both source lemmas (with *eimi* for example 28 and and *gignomai* for example 29). The similarity between these constructions may therefore be less than the comparison of grammatical profiles suggests.

(27)   *vъ tǫ noštь **bǫdete** dъva na loži edinomь*
         'on that night there will be two in one bed' (Mar. Luke 17:34)

(28)   *tu **bǫdetъ** plačь i skrьžetъ zǫbomь*
         'there will be weeping and gnashing of teeth' (Mar. Matt. 8:12)

(29)   *nъ ne vъ prazdьnikъ da ne mlьva **bǫdetъ** v ljudexъ*
         'Not during the feast, lest there be an uproar among the people.' (Mar. Matt. 26:5)

		es-imperfect	*es*-aorist
EXISTENTIAL	3sg	9	37
	3pl	10	2
EXISTENTIAL POSSESSIVE	3sg	0	4
	3du	0	1
AUXILIAROID	3sg	4	59
	3du	6	1
	3pl	20	2
POSITION/GOAL	3sg	9	56
	3du	1	0
	3pl	21	4

Table 9: Person/number distribution of *es*-imperfect and *es*-aorist across constructions in the existential group in OCS

Most of the constructions in this group have both *es*-imperfect and *es*-aorist attestations, but as shown in Table 9, there appears to be a preference for using the *es*-aorist in the third person singular and the *es*-imperfect in the plural (and dual). This is distribution is parallel to the one found for the AUXILIARY construction. This suggests that the two subparadigms were probably not perceived to differ semantically, and this is what we find when we inspect the examples.[17] In the AUXILIAROID group we find no difference between use with the

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[17] The third person singular examples of the *es*-imperfect in the EXISTENTIAL and POSITION/GOAL constructions are more common in Suprasliensis than in Marianus.

present active and passive participles: both forms appear with the same person/number preference pattern, and with no obvious contrast.

		eimi 'be'	*gignomai* 'become'
EXISTENTIAL	imperative	0	1
	infinitive	3	9
	l-form	1	3
EXISTENTIAL POSSESSIVE	imperative	0	4
	infinitive	1	0
	l-form	0	0
AUXILIAROID	imperative	3	0
	infinitive	1	0
	l-form	0	0
POSITION/GOAL	imperative	2	2
	infinitive	6	0
	l-form	7	0

Table 10: Greek source lemmas for imperatives, infinitives and *l*-forms in the existential group

With infinitives, imperatives and *l*-forms, we recognize the same pattern as we saw with the *bū*-present attestations: the EXISTENTIAL and EXISTENTIAL POSSESSIVE constructions have attestations that mostly translate change-of-state *gignomai* (example 30), whereas the AUXILIAROID and POSITION/GOAL constructions mostly have ones translating *eimi* (example 31)*.* Again, this indicates that the latter two constructions may not be as similar to the personal existentials as the plot in Figure 5 suggests.

(30)   *podobaatъ bo simъ prěžde **byti**. nъ ne u abie konьčina*
         'These things must happen first, but the end will not come right away.'
(Mar. Luke 21:9)

(31)   *gi ašte bi sьde **bylъ**. ne bi bratrъ moi umrъlъ*
         'Lord, if you had been here, my brother would not have died.' (Mar. John 11:21)

5.8 Some generalizations from constructional profiles
In comparing the behavior of *byti* across the constructions, we can make certain generalizations relevant to our hypotheses. The *bū*-present looks mostly like a future tense, but it has a stronger preference for change of state readings in the existential constructions in group 5. The "shared forms" (imperative, infinitive, *l*-form) also show a greater preference for change of state readings in the existential constructions. This preference for change of state is less characteristic of the POSITION/GOAL and AUXILIAROID constructions, however this level of detail is not captured by the distribution of the subparadigms. The only place where a real potential contrast between the *es*-imperfect and the *es*-aorist is possible is in the personal copular constructions, but the examples themselves do not give conclusive evidence for contrast.

6. Conclusion

Our goal was to determine whether OCS *byti* 'be' is best characterized as a single verb or as an aspectual pair of verbs. We have approached the competing hypotheses about the status of *byti* in as objective a fashion as possible, starting from tangible data on the forms of the verb and contexts of its attestations. We have presented the patterns in this data in terms of both grammatical and constructional profiles and investigated what these patterns mean both in aggregate and at the level of individual examples.

Based on previous studies of OCS and Russian, we know that verbs that differ in aspect also differ in their grammatical profiles. We therefore ran two rounds of correspondence analysis comparing the grammatical profile of *byti* to those of other OCS verbs to address the two hypotheses. When all the subparadigms of *byti* are taken together as a single verb, *byti* lands in the neighborhood of clearly imperfective verbs, some of which also share stative semantics. When the subparadigms are split according to their origin from the *es*-stem or the *bū*-stem, the two stems appear to behave as an aspectual pair. However, this second model is flawed in that it presumes an *es*-stem verb that has a very defective paradigm (with no imperative, infinitive, or past participle), fails to address any possible contrasts that could be expressed by the "duplicate" forms, and the division across the negative and positive Factor 1 values is arguably an artifact of the segregation of the subparadigms in the input. Thus whereas round one supports the one-verb hypothesis and round two supports the two-verb hypothesis, these results are not conclusive. Furthermore, this part of the analysis rests only on the morphological forms without taking into account their meanings, which is possible only in the context of the constructions.

We then applied constructional profiles to further test the hypotheses. Rather than using a pre-determined set of constructions, we allowed patterns to emerge directly from the data, yielding ten constructions describable in terms of their syntactic characteristics. A correspondence analysis of the grammatical profile of *byti* in each construction shows that there are two central groups of constructions representing personal copular, personal existential, positional, and "auxiliaroid" uses, and three constructions that are peripheral, representing auxiliary, existential impersonal, and copular impersonal uses. We used the Greek correspondences as an approximate indicator of the semantics of *byti*. The Greek data showed us that some groups of constructions were les uniform than subparadigm distribution alone might suggest.

This center-periphery structure suggests a radial category network of constructions for *byti*. This result is of both theoretical and descriptive value. From the perspective of cognitive linguistics, we would expect the polysemy of a verb such as *byti* to have the structure of a radial category, and the various nodes of that category to have different yet related meanings. Given the relationship between form and meaning, those meanings should then also be associated with differences in grammatical profiles and constructional profiles. Our correspondence analysis of *byti* constructions by grammatical profile (Figure 5) shows exactly the structure of relationships we would expect to obtain for a polysemous verb like *byti*. As far as we know, this is the first study to show how a radial category network structure can be obtained by purely objective means. In terms of description, the radial category network of this verb makes it possible to clearly identify the prototypical syntactic uses of *byti*, which also correspond

to a conceptual core. The auxiliary and impersonal uses are strongly differentiated from the remaining uses, and the "auxiliaroid" type is far removed from the true auxiliary.

We further inspected each group of constructions to seek any evidence that might support the two-verb hypothesis. Two of the peripheral constructions are apparently strongly specialized to use with only one of the stems: the AUXILIARY construction uses *es*-stem forms almost exclusively, and the EXISTENTIAL IMPERSONAL construction uses *bū*-stem forms exclusively. While these two constructions give credence to the two-verb hypothesis, the remaining constructions do not. These constructions (which also represent 89% of the data) use forms of both stems and do not provide evidence of the type of contrast we should find if the "duplicate" forms belonged to aspectually paired verbs. The *bū*-present subparadigm does not display the behavior that we expect from a perfective present in OCS. The infinitive, imperative, and *l*-forms clearly express both stative and change-of-state meanings, despite their *bū*-stem origins. There is no apparent semantic difference between the *es*-imperfect and the *es*-aorist, suggesting that the *es*-stem paradigm is more defective that van Schooneveld's clean separation implies. In general, we find that while the *es*-stem forms reliably express stative semantics, this meaning is also shared by all of the *bū*-stem forms (except the past participle).

We conclude that it is not plausible to analyze OCS *byti* as an aspectual pair of verbs. The data suggests instead the *byti* is a single, though polysemous, verb with a rich inventory of subparadigms and constructions. It is important to recognize that *byti* is indeed unusual, and to represent its unique features rather than trying to force it into a pre-determined structure. One could take issue with the very approach to the description of a verb and its subparadigms in terms of absolute values on the grounds that this type of analysis is artificially rigid. Our empirical approach moves beyond structuralism, acknowledging the complexity of the language data at hand and the fact that a verb can be many things, which is clearly the case for *byti*.

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