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# Prepositional antonymy in Croatian: a corpus approach

Prepositions as a word class pose various questions as to the relation between lexical and functional language units and their place in the lexicon (Jolly 1991, Šarić and Reindl 2001). Though often referred to as function words, prepositions show a) systematic semantic relations, ie. near–synonymy, polysemy, antonymy and b) a wide variety of lexical and functional (grammatical) uses, indicating a complex interplay of systematic features and contextual modifications which participate in the formation of their meaning. Semantic relations such as antonymy are mostly discussed in terms of adjectives, nouns and verbs, leaving out a detailed description of antonymy effects in other word classes such as prepositions (e.g. Lyons 1977, Cruse 1986, Jones et al. 2012). By adopting the methodology of antonymy research developed for identifying and extracting antonyms from corpora, we examine the co–occurrence of prepositional antonyms in the Croatian National Corpus. We take up the cognitive linguistic position of examining antonymy as a prototype based category based on both conceptual opposition and contextual modifications (Paradis et al. 2009), and we observe its workings on the novel prepositional dataset. Based on the primary domains and conceptual structures that motivate prepositional opposition formation, we divide the antonyms into *spatial* (directional and locational), *temporal* and *non–dimensional* types. For each of the antonym types there are different contextual modifications and conceptual structures that shape these antonymy relations, indicating a complex interplay between language system and language use.

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## 1. Introduction

Studies of antonymy and studies of prepositional semantics are usually regarded as quite distinct topics. Most research on antonymy[1] focuses on the

1 Many authors use *antonymy* as a more narrow term than *opposition* (e.g. Lyons 1977, Cruse 1986). Opposition in this sense would then include any type of semantic relation based on opposite features, and antonymy would be reserved for prototypical examples such as *hot – cold*. In this paper we will use antonymy when discussing the lexical relation between particular prepositions, to indicate both the form and the meaning as symbolic units of a language, and opposition when discussing the conceptual content motivating the lexical relation. We believe this helps maintain the balance in describing links within the lexical system and the conceptual structures that participate in its formation.

word classes of adjectives, nouns and verbs (see e.g. Cruse 1986, Lyons 1977, Fellbaum 1995, Šarić 2007, Jones et al. 2012). In these studies prepositional antonymy is sporadically mentioned within particular types of antonymy relations, such as *directional opposites* (e.g. *up – down, towards x – away from y*) or *converses* (e.g. *above – below*) (Lyons 1977, Cruse 1986, Šarić 2007). On the other hand, approaches to prepositional semantics mostly focus on their polysemy relations, i.e. the various meanings of a particular preposition (in context or in the lexical system), and these can be divided into those that seek to reduce prepositional meanings into core components in the lexical system (e.g. Bennet 1975), or those that propose semantically rich polysemous networks of prepositional meanings (see e.g. Brugman 1981, Lakoff 1987, Taylor 1993, 2003, Tyler and Evans 2001, 2003, Žic Fuchs 1991, Raffaelli 2009).

Most of the cognitive linguistic investigation into the semantics of prepositions is directed towards exploring their various metonymic and metaphorical meanings, particularly with regards to how they profile and construe their spatial meanings (e.g. Brugman 1981, Lakoff 1987, Taylor 1993, Hawkins 1993, Šarić 2008, Tyler and Evans 2003). The focus then would be on describing and relating spatial and non–spatial meanings of prepositions into a coherent semantic network. In Croatian literature such detailed investigations can be found in Šarić (2008), Kerovec (2012) and Matovac (2013)[2] and involve the description of polysemy networks of prepositions as well as schemas that unify their various meanings.

However, studies of prepositional semantics (regardless of their theoretical framework) also leave out a systematic account of synonymy and antonymy relations of prepositions. It is therefore the goal of this study to shed some light on the antonymy relations of prepositions in Croatian. The reason for the lack of literature on the topic is, in our opinion, due to the fact that prepositions are usually defined as both functional and lexical units[3] (see Jolly 1991, Rauh 1993), with very high frequencies of usage (Rohde 2001) and quite varied meanings across contexts. Therefore the pressing matters seemed to be either the focus on their grammatical functions or the description of their various meanings across contexts. We hope to show that research of antonymy relations of prepositions can also provide a new perspective on the existing questions regarding prepositional meanings and functions. Combining the two topics will not be an easy task, and therefore in what follows we aim to discuss a) specificities of the semantics and functions of prepositions relevant for their antonymy relations, b) extant research on the nature and definition of antonymy as a conceptually and contextually based relation and c) provide a beneficial common ground for these topics.

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2    Matovac also discusses some temporal meanings of spatial prepositions.

3    The division is also known in the literature as *content* and *function* words (Jolly 1991), corresponding to *autosemantic* and *synsemantic* words in the Croatian grammar tradition (Silić and Pranjković 2007). The distinction is based upon the idea that certain word classes (such as nouns) are more semantically autonomous and referential in nature, whereas others perform more relational and grammatical functions (e.g. prepositions).

As a primary goal of this study we put forth the identification of prepositional antonymy pairs in Croatian, and the description of the conceptual basis for these pairings, supported by corpus data (see below).

## 2. Features of Croatian prepositions

Croatian prepositions are explicitly defined as *synsemantic* (i.e. function) units in Croatian grammars, highly grammaticalized and dependent on other word classes (Silić and Pranjković 2007). Furthermore, Pranjković (2009) describes Croatian prepositions as specifying case affixes, and their semantics is described with regard to the preposition–case constructions they form (Silić and Pranjković 2007). In other words, Croatian prepositions govern cases, and the governing relation has consequences as to their meaning, e.g. *u grad:Acc* 'into the city' – directional meaning with the Accusative case, *u gradu:Loc* 'in the city' – locational meaning with the Locative case (see also Šarić 2008). Therefore it is an important future point of research to distinguish the semantic import of the preposition and the import of the case when it comes to, for instance, directional versus locational meanings[4]. In this paper we will discuss primarily the meanings of prepositions, but we will in fact present them as preposition–case constructions.

Many studies[5] (Fillmore 1968, Jolly 1991, Rauh 1993, Šarić and Reindl 2001) point out differences between semantically more independent prepositions, which bring with them more semantic information (e.g. *above, under, over*), and syntactically more dependent prepositions (e.g. *of, for, by*), which are semantically less informative. What can be deduced from this division is that *above* and *under,* for example, would more likely enter into an antonymy relation than *of* because they denote spatial or other semantic properties which can be put into a conceptual opposition (namely the UP – DOWN relation). *Of,* on the other hand, has the function of expressing Genitive relations (e.g. *can of beans*), and therefore it is less clear what its opposite could be. Furthermore, the semantics of one preposition can have semantically "more independent" (i.e. lexical) and semantically "more dependent" (i.e. functional) uses, and antonymy relations will depend on this as well. For example, Croatian preposition *do:Gen* 'to; until' can be part of a directional preposition phrase as in (1), *do grada:Gen* 'to the city', and a part of a phrasal verb *držati do* 'lit. to hold to; to appreciate' as in (2). In (1) there is an antonymy relation with the Source preposition *od:Gen* 'from', e.g. *od grada:Gen* 'from the city', but in (2) this is not the case since the preposition forms one semantic unit with the verb, creating a phrasal verb that does not have a Source–based antonym ?*držati od:Gen* 'to hold from' (see Katunar et al. 2012):

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4   Especially since cases without prepositions have various spatial and non–spatial meanings, see. e.g. Kerovec 2012, Tanacković Faletar 2011.

5   This holds true particularly for English prepositions, which are often described as analytical cases (Rauh 1993). In Croatian the preposition–case construction is analogous to this type of description.

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(1) *Išao je do grada.*     / *Išao   je    od    grada.*
    go.3.sg AUX to city.Gen.sg / go.3.sg AUX from    city.Gen.sg
    'he went to the city / he went from the city'
(2) *Držim do njegovog mišljenja.*
    hold to.1.sg his.Gen opinion.Gen
    'I appreciate his opinion'

Additionally, in example (3) *do:Gen* is used in a locational context as a proximity preposition, where instead of antonymy we find a synonymy relation with other proximity prepositions such as *kraj, uz, pored, pokraj* 'next to'[6]. The meaning of *do:Gen* 'next to' is obviously quite different than in (1), and therefore it lends itself to a completely different set of related prepositions – those of proximity.

(3) *Stojim do / kraj / uz / pored / pokraj    zida.*
    stand.1.sg.            next to           wall.Gen.sg.
    'I'm standing next to the wall'

These examples illustrate three important points about prepositional antonymy relations. Firstly, they are formed differently on the lexical – functional continuum of prepositional uses, where grammaticalization as in (2), *držati do:Gen* 'appreciate' sanctions antonymy relations as in (1), *do:Gen – od:Gen* 'to – from'. Secondly, polysemy is an important factor in the formation of different antonymy and synonymy relations as in the directional and proximity meanings of *do:Gen* 'to: until' and *do:Gen* 'next to'. Thirdly, both the lexical – functional properties and polysemous variations of meanings are construed via particular contexts, directional ones with verbs of movement (such as *ići* 'to go' in (1)) or locational verbs (e.g. *stajati* 'to stand' in (3)). The interplay of these factors may point to a more complex and stratified view of prepositional meanings and the way prepositional antonymy is formed.

## 3. Antonymy – a paradigmatic and syntagmatic relation

Turning to an overview of existing approaches to antonymy we will discuss the main points in defining antonymy from a usage–based perspective, and how this reflects the main goals of our own research. The usage–based definition of antonymy differs in many respects from the traditional and structuralist definition of antonymy as a paradigmatic relation of oppositeness between lexical units in the language system. A traditional treatment of antonymy can be found for example in Nida (1975), where he describes it as one of the four main interlexical paradigmatic relations based on discrete components that complement each other and therefore establish a link between two quite diffe-

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6   Croatian has a larger inventory of proximity prepositions, which all lend themselves to the translation as 'next to', disregarding for the moment fine–grained differences in their meanings.

rent notions, such as *hot* and *cold, rich* and *poor*. Therefore, from a structuralist perspective, lexical units in a paradigmatic relation constitute substitutable expressions on the syntagmatic axis, e.g. *the water is hot/cold* (Cruse 1986). Ideally, members of an antonymic pair should be freely substitutable without any effect on their grammaticality and syntactic properties (Panther and Thornburg 2012). However, many corpus–driven studies of antonyms point out that this so called *substitutability hypothesis* is untenable when it comes to defining the emergence and properties of antonyms (Justeson and Katz 1991, Jones 2002, Jones et al. 2012, Paradis et al.[7] 2015). Contrary to traditional approaches, they propose that antonymy is a syntagmatic relation serving various discourse functions, and is obtained between words in use. These claims were first substantiated with the study of *intrasentential co–occurrence* of antonym adjectives by Justeson and Katz (1991) that showed that antonyms co–occur within one sentence much more frequently than expected, and that the syntagmatic properties of antonymy relations are therefore highly relevant in identifying and extracting possible antonymy candidates. Jones (2002) and Jones et al. (2012) expanded on these observations by proposing constructional frames for various types of antonymy relations, which are defined by their function in discourse and not traditional types of paradigmatic antonymy (e.g. scalarity, *hot – cold,* converseness*, buy – sell*). One example of a constructional frame is the Transitional antonymy frame, *from X to Y,* which has the function of expressing movement or change from one antonymous state to another, e.g. *from success to failure* (Jones 2002). These frames facilitate the integration of canonical antonyms in discourse, such as *success – failure,* but also help to produce new non–canonical antonymy relations, such as *fireflies prefer* **tall** *grass to* **mowed** *lawns,* where *tall – mowed* would not be understood as antonyms without contrastive context (Jones et al. 2012:134). More of these frames are discussed by Jones et al. (2012) for English and Swedish, though, as to our knowledge, there has been less investigation of this kind into other languages.

### 3.1. Antonymy and prepositions – common ground

Research of antonymy and research of prepositional semantics have posed similar, yet differently studied questions, mainly regarding the interplay of syntagmatic and paradigmatic relations in language, as well as relations between language system and language use. Problems posed by distinguishing polysemous senses for prepositions are still quite pronounced in lexicographic and lexicological research, and questions about the strength and emergence of antonymy relations continue to be discussed in the literature. Thus what is the common ground between the two topics is the question of how syn-

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7   Paradis et al. (2015, forthcoming) actually propose a combined outlook on the *substitutability* and *co–occurrence* hypotheses by investigating adjectives appearing individually in corpora; they show that the individual uses of adjectives correspond best to their antonym pairs. Therefore they suggest that the two hypotheses are just different ways of looking at the phenomenon of antonymy and are not necessarily contradictory.

tagmatic properties and contextual dependencies shape and influence both polysemy and antonymy. In usage–based cognitive linguistic approaches both of these phenomena are regarded as *prototypically structured* categories, with prototypical members having high frequency pairings, strongly entrenched in speakers' memory and being reinforced through usage events (Paradis et al. 2009, Jones et al. 2012, Paradis et al. 2015 (forthcoming)). Less prototypical members form a continuum from better to worse examples of the category. In antonymy research the term used for the best members of the category is *canonical antonyms.* Canonicity is defined as the level of semantic relatedness and conventionalization in discourse, and Paradis et al. (2009) view it as a property of a limited set of highly opposable (adjective) antonyms[8]. In our own data we will also focus on proposing candidates of canonical prepositional antonyms, based on the strength of conceptual opposition as well as frequency data from the corpus. These candidates, however, should be tested further to confirm or disprove their canonicity status, and such investigations go outside the scope of this study.

## 4. Prepositional antonymy – research questions, methodology and data

As previously stated, we propose to examine antonymy pairs in corpora uses in order to find the stable and systematic features of prepositional semantic structures active in the opposition pairing. Applying the methodology from corpus driven studies on prepositional data will also help to evaluate the methods and framework of antonymy research, and to expand it with novel data. In particular we will address three questions with regard to prepositional data:

a) what is the conceptual basis of antonymy relations for Croatian prepositions (directional, locational and so forth),

b) are there better or worse examples of prepositional antonyms (i.e. can there be highly context dependent non–canonical examples of prepositional antonymy),

c) to what extent are these relations dependent on specific semantic features of particular prepositions (dimensionality, container / surface profiling and so forth).

### 4.1. Methodology

In our research we used the Croatian National Corpus 3.0 (henceforth: CNC), consisting of over 200 million tokens. It is a general corpus of Croatian that contains texts from various literary, administrative and newspaper genres, and therefore we believe it cross–cuts different types of discourse and can be used to gain a broad insight into prepositional uses. Using lexicographic resources, e.g. Croatian monolingual dictionaries, proved to be of little use in providing an inventory of prepositional antonyms since in many respects these

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8    Though they point out the continuum of good and bad antonyms to be much more scalar than discrete.

are not coded systematically or at all (see Hudeček and Mihaljević 2008 for a discussion on the lexicographic treatment of Croatian preposition antonyms). Therefore in order to extract and identify antonymy candidates we have taken the notion of antonym co–occurrence as the starting point of our research. It is important to note, however, that we use co–occurrence as a means of extracting and identifying antonymy candidates from the CNC and not as a sole criterium for establishing antonymy relations[9]. As one of the very frequent frames for antonyms listed by Jones et al. (2012) we used the frame *X Conj Y*, e.g. *good or bad, rich and poor*. The conjunction in this construction has the function of distinguishing or coordinating antonyms, e.g. *or* and *and,* respectively. Using prepositions in this construction may be considered substandard[10] in Croatian grammars because it is expected that each preposition governs its own NP case, e.g. *idem u hotel:Acc ili iz hotela:Gen* 'I'm going to the hotel or from the hotel'. However, leaving out the redundant NP is quite common, e.g. *idem u ili iz hotela:Gen* 'I'm going to or from the hotel', and it goes to show that contextual inference, and more importantly, the preposition *u* 'into; to' is enough to produce a full directional reading of the expression. In our data it is always the first NP that is left out, and the second NP has a case marking governed by whichever preposition is the latter one, e.g. *u ili iz hotela:Gen / iz ili u hotel:Acc* 'into or out of the hotel / out of or into the hotel'. With our narrow query we obtained 5440 results of co–occurring preposition pairs in the corpus, e.g. *u ili iz luke Ploče*[11] 'into or out of the Ploče harbour'. Because prepositions are highly frequent lexical units and appear in various preposition phrases, a wider query with two full prepositional phrases, P NP Conj P NP, resulted in a high number of non–antonymous preposition phrases, as in example (4):

(4) ...*kuća*       **bez** *namještaja*       *i* **na** *dobroj*     *lokaciji...*
    *house.NOM* **without** *furniture.GEN and* **on** *good.LOC location.LOC*
    'a house without furniture and on a good location'

All the examples obtained by the wider query will be investigated in future research, when the basis for antonymy candidates is established through the narrow query on which the analysis can be built upon[12]. We want to stress that the narrow frame was used in order to extract possible antonymy candidates, but examples as in (5) are also very frequent[13]:

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9    For an in depth discussion on the influence of co–occurrence frequencies in antonymy relations see van de Weijer et al. (2012).

10    In Croatian grammars the standard use would always require a noun phrase after a preposition, see Silić and Pranjković (2007). However, in substandard speech the omission of the first noun phrase is not uncommon, if it is the same noun phrase and the repetition is considered redundant.

11    Examples presented are taken from the CNC.

12    Thus we can search for particular, already identified preposition pairs in different constructions.

13    In fact, the source – goal opposition as in (5) appears 16 899 times in the corpus, with preposition pairs *od:Gen – do:Gen* 'from – to', *s(a):Gen – na:Acc* 'off of – onto' and *iz:Gen – u:Acc* 'out of – into', see Katunar and Berović, forthcoming.

(5)  *prevoze teret s kopna na otoke*
     transport.3.PREZ cargo.Nom off of land.Gen onto island.Acc.pl
     'they transport cargo from the land to the islands'

### 4.2. Results and data

After the corpus examples were obtained, we manually checked them in order to remove wrongly tagged words (e.g. adverb tagged as preposition) or non–antonymous preposition pairs, e.g. *unatoč i usprkos vapnenačkom kraju* 'despite and in spite of the limestone landscape'[14]. After the manual overview we obtained 3693 examples of prepositional antonymy candidates, with all together 26 antonym pair candidates. These were obtained by going through the frequency lists[15] and collapsing all the possible variations of a pair into one category, e.g. variations of the conjunction, *s(a):Instr i / ili / nego bez:Gen* 'with and / or / than without', or the ordering of the prepositions, e.g. *bez:Gen i s(a):Instr* 'without and with'. The results are presented in Figure 1 below:
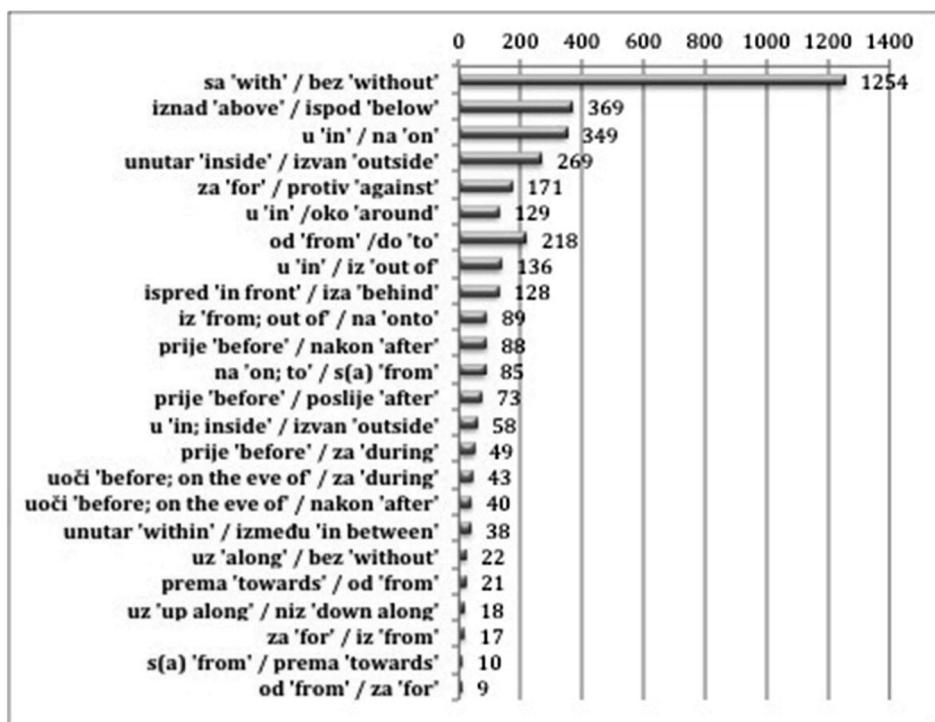


Figure 1. Co–occurrence of preposition pairs from the CNC. Preposition pairs are listed on the left side of the graph along with the English translation and the numbers

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14  Interestingly, many of the non–antonymous prepositions appear in a synonymous relation, and therefore it would a matter of future research to explore both relations in these constructions.

15  Provided by the CNC NoSketchEngine web interface.

on the right represent absolute frequencies of corpus examples in which they co–occur as pairs.

As is shown in Figure 1, the frequencies of prepositional pairs vary and seem to imply that there is a scalar continuum from stronger to weaker antonyms. The most frequent and possibly the best example of a canonical pair is the pair *s(a):Instr – bez:Gen* with 1254 occurrences, e.g. *sunčaju se sa ili bez šešira* 'they sun bathe with or without a hat'. *Bez:Gen* 'without' is analyzed by Silić and Pranjković (2007) as a kind of "prepositional negation", so they could be analyzed as the only pair with a binary opposition proper (see analysis below). However, the rest of the pairs seem to point to prepositional antonymy as a gradual phenomenon with better or worse pairs being reiterated through use. We turn to its qualitative analysis in the next chapter.

## 5. Data analysis – types of prepositional antonyms

We observed that the preposition pairs in our data can be divided according to the primary domain they belong to. Thus there are 16 spatial preposition pairs, 5 temporal pairs and 3 non–dimensional pairs (Pranjković 2002), expressing means (*s(a):Instr – bez:Instr, uz:Acc – bez:Instr* 'with – without') and adversativity (*za:Acc – protiv:Gen* 'for – against'). Though *protiv:Gen* 'against' has a primary meaning of contrary motion[16], it is not found in any of the spatial pairs, whereas other prepositions such as *uz:Acc* 'along; with' do appear in more than one of these domains, *uz:Acc – niz:Acc* 'up along – down along'. From our observation it seems that conceptual oppositions (see research question a)) expressed by the pairs seem to depend on the properties of each of these domains (space, time and so forth), and thus we analyzed and divided the antonymy pairs into three types: a) spatial prepositional antonyms, b) temporal prepositional antonyms and c) non–dimensional antonyms.

### *a) Spatial preposition antonyms*

Spatial prepositions form the most numerous group of antonymy pairs, and they can be further divided into *directional* and *locational* preposition pairs, some according to the case constructions they appear in, e.g. *u:Acc* 'into' / *u:Loc* 'in'. Though we defined them as spatial prepositions, the antonym pairs can appear in non–spatial examples as well, as in (6):

(6) *objavio       je 2 prijevoda            s ili na   strani    jezik*
publish.3.sg AUX 2 translation.Gen.pl off of or onto foreign.Acc language.ACC
'He published 2 translations from and to a foreign language'

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16   E.g. *plivati protiv struje* 'to swim against the current', http://hjp.novi–liber.hr/, Croatian Language Portal.

These examples are however lower in frequency, and the spatial domain is still the basis for the antonymy relations, as we will discuss below[17].

### a.1) Directional opposites

Directional opposites are the most numerous of the pairs, and we list them below along with the number of pair occurrences in the CNC and examples:

1. *od:Gen – do:Gen* 'from – to' 218     *putovanje od ili do zračne luke*
'travel from and to the airport'
2. *iz:Gen – u:Acc* 'out of – into' 136     *put u ili iz grada*
'the way into or out of the city'
3. *iz:Gen – na:Acc* 'from out of – onto'    89     *davanja iz ili na plaću*
'payments out of or onto the salary'
4. *s(a):Gen – na:Acc* 'from, off of – onto' 85     *prijevoz s kopna na otoke*
'transport from land onto the islands'
5. *uz:Acc – niz:Acc* 'up along – down along' 38     *hoda uz ili niz stepenice*
'he walks up and down along the stairs'
6. *od:Gen – prema:Dat* 'from – towards'    21     *približavanje Zemlje od ili prema Suncu*
'Earth's approach from or towards the Sun'
7. *iz:Gen – za:Acc* 'for – from out of'     17     *vlak iz ili za Split*
'a train from or for Split'
8. *s(a):Gen – prema:Dat* 'off of – towards' 10     *slanje podataka s ili prema internet mreži*
'sending data off of or towards the internet'
9. *od:Gen – za:Acc* 'from – for' 9     *transport od ili za druge države*
'transport from or to (lit. for) other states'

Most of the pairs, with the exception of *uz:Acc – niz:Acc* 'up along – down along', profile the Source and Goal points in the SOURCE – PATH – GOAL schema (e.g. Langacker 1987, Belaj 2009), as in (7) and (8).

(7) *svrha*          *mora biti*    *prijevoz*          *to ili od*    *pravne osobe*
purpose.Nom.sg. must be.Inf transport.Nom.sg. to or from legal.Gen.sg.
person.sg
'the purpose must be transport to [GOAL] or from [SOURCE] a legal entity'

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17   The construction *u ili iz* 'into or out of' appears 39 times, all of them in spatial meanings, e.g. *u ili iz države, plovila, zemlje..* 'into or out of the state, boat, country…'.

(8) *ptičja influenca se proširila     iz    ili u     druge       države*
     bird flu.Nom.sg. REFL spread.Prez. out of or into other.Gen.pl states.Gen.pl
     'Bird flu has spread from [SOURCE] and to [GOAL] other states'

This is also in line with the traditional view of directional opposites and conforms well to its definition. Additionally, the most frequent antonym pairs, *od:Gen – do:Gen* 'from – to', *iz:Gen – u:Acc* 'out of – into', *iz:Gen – na:Acc* 'from out of – onto', *s(a):Gen – na:Acc* 'from, off of – onto' have particular properties with regards to the way they profile the dimensionality of the noun phrase object, as one, two or three dimensional, respectively. In Hawkins' (1993) terms this would be called Landmark (henceforth: LM) configuration, and it pertains to the way that spatial properties of the NP are configured by the preposition, e.g. *na travi* 'on the grass' – two dimensional or *u travi* 'in the grass' – three dimensional. The two examples would therefore have different conceptualizations of the entity 'grass', as a surface in the former and a container in the latter example. Our data show that the co–occurring prepositional antonyms, *od:Gen – do:Gen* 'from – to', *iz:Gen – u:Acc* 'out of – into' and *s(a):Gen – na:Acc* 'from, off of – onto', appear in this "symmetrical" opposition, prototypically configuring one dimensional points (*od:Gen – do:Gen* 'from – to'), two dimensional (*s(a):Gen – na:Acc* 'from, off of – onto') and three dimensional entities (*iz:Gen – u:Acc* 'out of – into'). In other words, it is more likely that both members of a pair co–occurring together will be of the same dimension profile – *u:Acc* 'into' will more likely occur with *iz:Gen* 'out of' than *s(a):Gen* 'off of' (see examples in (9)). Goodness of antonymy relations of these pairs would then certainly depend on the dimensional feature symmetry between Source and Goal opposites with respect to LM configuration. This is shown in (9), where only the first sentence is fully acceptable (LM configuration is marked as 1D, 2D, and 3D):

(9) *propuštanje vode      u    ili iz     spremnika*
     flow.NOM water.GEN into or out of container.GEN.
     'water flow into [3D] or out of [3D] a container'

     *??propuštanje vode u ili sa spremnika*
     'water flow into [3D] or off of [2D] a container'

     *?? propuštanje vode do ili iz spremnika*
     'water flow to [1D] or out of [3D] a container'

This feature symmetry can be related to one of the main definitions of antonymy, and that is that antonyms proper are similar on almost all of the semantic properties but one. So for scalar antonyms, e.g. *hot – cold,* the domain of temperature and all the other features are alike, but the points on the scale are different and hence produce an antonymy relation (Jones et al. 2012).

On the other hand, the pair *iz:Gen – na:Acc* 'from out of – onto' is highly contextually constrained, and the examples pertain to the domain of economy, particularly money transfers onto bank accounts and salaries. The high frequ-

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ency of the pair in our opinion has to do more with the structure of the CNC texts from this domain than with the strength of the antonym pair itself.

Furthermore, the pairs with lower frequencies seem to modify the Source – Goal opposition in different ways. One is by substituting Goal for Goal approximation, as in *od:Gen – prema:Dat* 'from – towards' and *s(a):Gen – prema:Dat* 'off of – towards' in (10) and (11).

(10) *leta        koji se        odvija      prema ili od    kopnenih    lokacija*
   flight.Gen.sg which REFL occur.Pres. toward or from land.Gen.pl location. Gen.pl
   'a flight which occurs towards or from inland locations'

(11) *u cestovnom prijevozu        s      ili prema            teritoriju države*
   in road.Loc.sg transport.Loc.sg off of or toward state.Dat.sg territory.Dat.sg
   'road transport from or towards state territory'

The Source – Goal opposition in these pairs is certainly not prototypical and not a good candidate for canonicity, however it is established on the basis of the prototypical movement from and to particular end points of a path.

Another set of pairs is highly contextually constrained, *iz:Gen – za:Acc* 'for – from out of' and *od:Gen – za:Acc* 'from – for', and they denote public transport destination, e.g. *vlak za i iz Splita* 'train for and from Split'. It seems that *za:Acc* 'for' as a Goal preposition would be highly specialized in its use for transport destinations, and other Goal prepositions would be more dominant in many of the remaining constructions.

### a.2) Locational opposites

Locational opposites seem to exploit dimensional features of objects in another way, depending on perspective change and three dimensional construal of entities (see e.g. Kerovec 2012). There are 7 antonym pairs in our data:

1. *iznad:Gen – ispod:Gen* 'above – below' 369    *iznad ili ispod stola*
                                                  'above or under the table'
2. *u:Loc – na:Loc* 'in – on'                 349    *tvari u ili na voću*
                                                  'substance in or on the fruit'
3. *unutar:Gen – izvan:Gen* 'inside – outside' 269    *unutar ili izvan kuće*
                                                  'inside or outside the house'
4. *u:Loc – oko:Gen* 'in – around'            129    *u ili oko posjeda*
                                                  'in or around the property'
5. *ispred:Gen – iza:Gen* 'in front – behind' 128    *ispred ili iza vozila*
                                                  'in front or behind the vehicle'
6. *u:Loc – izvan:Gen* 'in – outside'          58    *u ili izvan kuće*
                                                  'in or outside the house'
7. *unutar:Gen – između:Gen* 'inside – between' 38    *unutar ili između država*
                                                  'inside or in between states'

Each of these pairs exploits the three dimensional relations in a different way, expressing various relevant oppositions when it comes to positing objects in space. The vertical axis is expressed by the pair *iznad:Gen – ispod:Gen* 'above – below', and the horizontal one by the pair *ispred:Gen – iza:Gen* 'in front – behind'. The vertical opposition is the most frequent one, and this has to do in our opinion with many metaphorical uses of the pairs, and the connection of the UP – DOWN schema relation to many domains, such as temperature, social hierarchy and quality evaluation. Taylor (2003) discusses the UP – DOWN image schema as being highly productive in many domains of our experience, and hence it stands to reason that the examples such as *iznad ili ispod svojih mogućnosti* 'above or below ones' possibilities', *temperature iznad i ispod 0* 'temperatures above and below 0' etc. are all realization of a very basic spatial relation. There are also morphologically simple variants of these prepositions, *pod:Instr* 'under', *nad:Instr* 'below', however, they were not found in our data. *Pod:Instr* 'under', for instance, has obtained other functions similar to the English *under,* e.g. *pod utjecajem* 'under the influence' but not *\*ispod utjecaja* 'below the influence'. The opposition based on the spatial relation therefore seems to be more productive in the morphologically complex pair *is–pod:Gen – iz–nad:Gen* 'above – under'.

The opposition *unutar:Gen – izvan:Gen* 'inside – outside' is based on the boundedness of objects or areas, e.g. *unutar ili izvan teritorija države* 'outside or inside the territory', and similarly the opposition of *unutar:Gen – između:Gen* 'inside – between' is based on the notions of more than one bounded object, entity or area and the space between them, e.g. *razmak unutar ili između spremnika* 'the space inside or between containers'. *Unutar:Gen* therefore shows how different opposition relations come from the different types of spatial configurations, and multiplex conceptualization of objects (i.e. more than one object). *U:Loc – izvan:Gen* 'in – outside' is also an example of varying interlexical relations based on very similar spatial relations, however, many examples include activity nouns as trajectors, e.g. *godišnji odmor / praksa / djelatnosti u ili izvan države* 'vacation / internship / activities in or outside of the country'. Also, *unutar:Gen* seems to be more specific and denote borders of objects as well, not only three dimensional properties of objects, compare the examples *letovi unutar Hrvatske / ?letovi u Hrvatskoj* 'flights inside Croatia / flights in Croatia'. The former example refers to flights with starting and ending points inside the Croatian territory, and the latter could eventually refer to 'flights occurring in Croatia', e.g. *letovi u Hrvatskoj su skupi* 'flights in Croatia are expensive'. *U:Loc* enters into a third opposition relation based on the center–periphery contrast, *u:Loc – oko:Gen* 'in – around', e.g. *ilegalna izgradnja u ili oko imanja* 'illegal construction in or around the property'.

*U:Loc – na:Loc* 'in – on' present an interesting pair since they are very frequent but do not conform to the typical two–point opposition as the previous examples. The contrast is related to surface – interior positioning in three dimensional objects, but their opposition seems to be more pronounced in certain highly specified contexts, such as food production, e.g. *pesticidi na ili u voću* 'pesticides in or on fruit'. In such contexts it is relevant to be able to

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differentiate the location of the trajector (pesticides) since they can be removed differently if inside or only on the surface of fruits (e.g. washing). In terms of conceptual opposition strength and indication of prototypical or canonical antonymy they would be non–canonical and non–prototypical due to their specific contextual constraint. Their relation could be best described as *semantic incompatibility* rather than antonymy proper, similar to what Lyons (1977) comments about the pairs "adjacent" to one another and not necessarily opposite to each other, such as *east – north,* as opposed to pairs *east – west*.

The spatial relations are shown schematically for spatial antonymy pairs are presented in Figure 2 below. The SOURCE – PATH – GOAL schema and the three dimensional spatial configuration of objects are both integrated into one representation as to unify the spatial types of opposition.
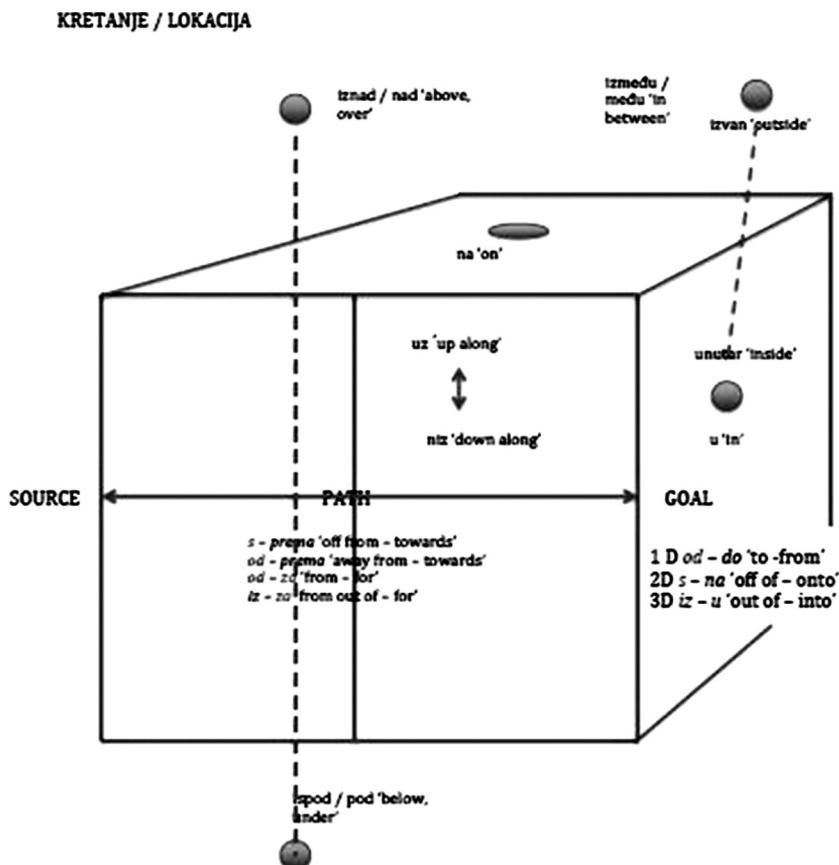


Figure 2. Schematic representation of opposition points for spatial antonym preposition pairs. It is a unified representation of the spatial relations, representing locational opposites as points in a three dimensional space, with opposites connected by a dotted line, and directional opposites are marked in the middle with a linear arrow line marking SOURCE, PATH and GOAL points. Prepositions corresponding to these opposition points are listed next to them.

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### b) Temporal preposition antonyms

There are three temporal preposition antonyms in our data representing the preceding and antecedent points relative to an event:

1. *prije:Gen – nakon:Gen* 'before – after'  88      *prije ili nakon Božića*
'before or after Christmas'
2. *prije:Gen – poslije:Gen* 'before – after'[18]  73       *prije ili poslije doručka*
'before or after breakfast'
3. *uoči:Gen – nakon:Gen* 'on the eve of'/ after' 40 *uoči ili nakon Nove godine*
'on the eve of or after New year'

All pairs schematize the temporal event structure as built up around one event, either durative or punctual, represented in Figure 3, e.g. *sastati se prije ili poslije izbora* 'to meet before or after the elections', *održati nastup neposredno prije ili nakon ceremonije otvaranja* 'to hold a performance just before or after the opening ceremony', *sniženja uoči ili nakon blagdana* 'sales in the eve of or after the holidays'.

**TEMPORAL**
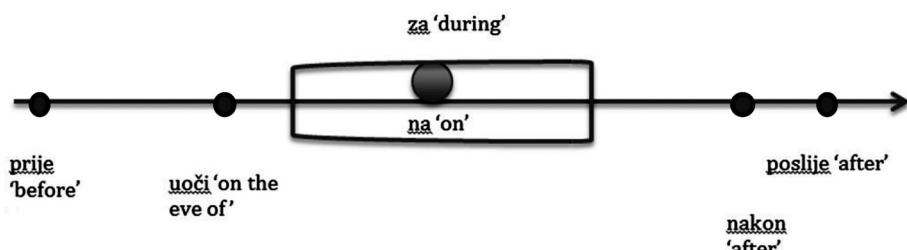


Figure 3. Temporal opposition schema. Prepositions are listed below the points on the temporal line which they denote in relation to the central event. *Za:Gen* 'during' and *na:Acc* 'on' are placed on the central point.

There are slight differences in the timing of the temporal points before and after an event, so it seems that *uoči:Gen* 'on the eve of' denotes a closer proximity of the event than *prije:Gen* 'before'. *Nakon:Gen* 'after' may also carry a similar distinction to *poslije:Gen* 'after', with many examples have the modifier *neposredno* 'directly; just', e.g. *neposredno nakon* 'right after' (1960 occurrences of the collocation in the CNC) as opposed to *neposredno poslije* 'right after' (113 occurrences).

The distinction between *za:Gen* and *na:Acc* 'on' is one of durativity versus punctuality of the event, and these pairs can be found in non–canonical examples, e.g. *prije ili za izbora* 'before or during elections'. They are also often found with temporal noun constructions *za vrijeme* 'during the time of' and *na dan* 'on the day of'.

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18   The pair *prije:Gen – poslije:Gen* 'before – after' can also appear in the idiomatic phrase *prije ili poslije* 'sooner or later', these examples were manually excluded.

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### c) Non–dimensional antonymy pairs

In line with Pranjković (2002) we decided to name the third group of prepositional antonyms *non–dimensional*. This is due to the fact that the opposition in these pairs does not come from schematic information about different points in space and time, but other types of opposition, namely related to instrumentality, adversativity and accompaniment. As we mentioned previously, *bez:Gen* 'without' functions as a type of prepositional negation. *S(a):Instr – bez:Gen* 'with – without' is the opposition exploiting the sociative and instrumental meaning of *s(a):Instr* 'with', e.g. *s ili bez Marije* 'with or without Marija', *s ili bez vilice* 'with or without a fork'. *Uz:Acc* 'along with' is the metaphorical sense transferred from the domain of space, e.g. *uz rijeku* 'along the river' where it keeps the features of accompaniment, e.g. *uz moj pristanak* 'along with my consent', differing from *s(a):Instr* by the lack of the instrumental meaning. Compare the examples in (12) and (13):

(12) *situacija      se     promijenila uz      moj pristanak*
     situation.Nom.sg REFL change.Pres along with my consent.Acc
     'the situation changed along with my consent'

(13) *situacija se promijenila s mojim pristankom*
     situation.Nom.sg REFL change.Pres with my consent.Instr.sg
     'the situation changed with my consent'

In the example (13) we can say that the consent is the instrument of change, and in the (12) it only facilitates it. *Za:Acc – protiv:Gen* 'for – against' are evaluative (adversative) pairs, and they pertain to the domain of attitude, expressing the opposing stance, e.g. *glasovati za ili protiv na referendumu* 'to vote for or against on the referendum'.

As we can see from these examples, they are differently structured than spatial and temporal pairs, and function more binary (i.e. complementary) than other antonymy pairs we observed. We propose, for the time being, that this is related with different conceptual background knowledge one has about instrumentality, adversativity or accompaniment, and which doesn't lend itself to the same type of (schematic) opposition relations as in the other domains we described. Thus we can note that there are some differences among the prepositions included in our data which reflect their semantics and the way it is shaped by domain–specific conceptual content.


## 6. Conclusion

In this paper we studied a relatively unexplored topic of prepositional antonymy in Croatian. Using the methods developed for the research of adjective and noun antonyms we gathered data from the CNC and found 26 antonymy pairs that illustrate the complexity of prepositional antonymy. It is important to note that the notion of co–occurrence, used as a method for identifying and

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extracting our antonymy candidates, proved to be a good tool in providing a set of antonymy pairs which were than further analyzed according to their semantic properties and contextual specificities. This is relevant as to the application of the co–occurrence method to a novel word class – that of prepositions – which has rather different syntactic and semantic properties than adjective and nouns.

Observations of co–occurrence frequencies of particular pairs also showed a gradual decline in pair frequencies from best to worse pairings. A subsequent qualitative analysis of the semantic properties of these pairs points to the fact that frequently co–occurring pairs are the ones that denote relevant conceptual oppositions such as Sources and Goals, vertically or horizontally opposing location points, linear temporal opposition (before – after) and so forth. Based on the primary domain of particular antonymy pairs, we classified them into *spatial, temporal* and *non–dimensional types* of opposites. Through an analysis of the schematic properties of each of these domains, we described the conceptual bases for their antonymy relations. Such a classification tells us something about the way opposition can be expressed relative to these domains, and it is a point of future research to explore the particular workings of opposition in each of these domains. We take this study to be the starting point of this research.

We can also conclude that there are prototypical opposition relations expressed by prepositions, while some of the antonymy pairs in our data are more context specific, and therefore dependent on specific knowledge provided by these contexts (e.g. the case of pesticides 'in' or 'on' the fruits). This is in line with other usage–based studies of antonymy (see above), however, it extends the analysis to a set of high frequency words whose specific semantic and syntactic properties are rather different from previously studied word classes. Furthermore, we find this approach to be complementary to the traditional focus on the polysemous structures of prepositions, as it helps us examine the great variety of prepositional meanings in light of the salient semantic (and conceptual) features of prepositions participating in opposition formation. Some of these features, such as profiling one, two or three dimensional objects, are relevant when it comes to using the pairs with the same dimensional features together as opposed to different ones. The antonymy pairs we discussed can serve as the basis to elicit more potential antonymy pairs as well as examine other constructions where prepositional phrases serve to denote contrast. It also our belief that they provide a new perspective on the workings of prepositional semantics in language system and language use.

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## Prijedložna antonimija u hrvatskome: korpusni pristup

Prijedlozi kao vrsta riječi otvaraju mnoga pitanja o vezi leksičkih i funkcionalnih riječi i njihovu mjestu u leksikonu jezika (Jolly 1991, Šarić and Reindl 2001). Iako se često definiraju kao funkcionalne jedinice jezika, prijedlozi pokazuju: a) sustavne semantičke odnose, odnosno sinonimiju, polisemiju i antonimiju i b) veliku raznolikost njihovih leksičkih i funkcionalnih uporaba koja upućuje na složene odnose njihovih obilježja u jezičnom sustavu i kontekstualnih modifikacija koje sudjeluju u oblikovanju njihovih značenja. Međuleksički odnosi, poput antonimije, većinom se usredotočavaju na opise punoznačnih riječi poput imenica, pridjeva i glagola, izostavljajući sustavan opis antonimije u drugim vrstama riječi kao što su prijedlozi (e.g. Lyons 1977, Cruse 1986, Jones et al. 2012). Stoga je cilj rada ponuditi opis prijedložne antonimije koristeći se metodama razvijenim za identifikaciju antonima u korpusima, poglavito metode *supojavljivanja* antonima u različitim kontekstima. U skladu s kognitivnolingvističkim pristupom antonimija se definira kao prototipno ustrojena kategorija utemeljena na konceptualnim strukturama, kao i na kontekstualnim modifikacijama (Paradis i sur. 2009). Prijedložni antonimski parnjaci grupirani su u tri kategorije na temelju primarnih domena kojima pripadaju te konceptualnih struktura koje motiviraju razvoj njihovih opozicija, *prostorni* (*direkcionalni* i *lokacijski*), *vremenski* te *nedimenzionalni* antonimi. Za svaku kategoriju antonima raspravlja se o različitim konceptualnim strukturama kao temelju za uspostavu odnosa suprotnosti te kontekstnim modifikacijama koje utječu na ovaj međuleksički odnos. Antonimija se tako kao međuleksički odnos proučava s obzirom na složenosti unutarleksičkih, odnosno polisemnih struktura prijedloga, kao i sintagmatskih odnosa koji je odražavaju i motiviraju. Takav se međuodnos sintagmatskih i paradigmatskih odnosa promatra kao indikator složenih odnosa između jezičnog sustava i jezične uporabe.

**Key words:** prepositions, lexical relations, antonymy, opposition, Croatian
**Ključne riječi:** prijedlozi, leksički odnosi, antonimija, hrvatski jezik