Understanding and translating (spatial) prepositions: An exercise in cognitive semantics for lexicographic purposes

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Departing from the observation that the portrayal of prepositional semantics in bilingual, but also monolingual dictionaries — and, more generally, EFL materials — is mostly inadequate (inaccurate, misleading and with mismatched examples), in this paper we will try to show that a cognitively based account of prepositional meaning has much to offer to lexicographers and EFL students. After a preliminary analysis of the semantics of the lexical category 'preposition' we will move to more concrete 'problems and solutions' by cross-linguistically examining a set of spatial prepositions. Following some insightful studies by Bowerman (e.g. with Pederson, 1992, and with Choi, 2001) we will first take a cross-linguistic look at the spatial relations rendered by the English 'on' and 'in' and try to define the meaning of these two prepositions in terms of cognitively based, primitive semantic features. We will then analyse the lexicographic portrayal of 'on' and 'in' in a bilingual English-Croatian dictionary, noting the problems and trying to suggest some improvements, that stem from the cognitively grounded semantic analysis suggested in the first part of this work. In the final part of the paper we will probe the proposed methodology on a particularly troublesome preposition for Croatian foreign learners i.e., 'at', one that lacks a central translational equivalent in Croatian, and which thus gives rise to particularly complex problems. Although being developed around the English-Croatian cross-linguistic pair, the observations and suggestions in this paper are built on a universal basis, thus being intended as relevant for the lexicographic representations of prepositions in general.

Introduction

The problem

Most, if not all (E)FL teachers and students are painfully aware of the fact that when it comes to mastering a foreign language one of the most troublesome areas to learn is the (idiomatic) usage of prepositions. Learning how to use prepositions correctly in a foreign language is a colossal task, one that is usually not accomplished way into the learning process, and one that many learners never manage to master thoroughly. As Lindstromberg (2001: 80) points out, less than 10 % of upper-level EFL students can use and understand prepositions correctly (cf. also Coppieters' 1987 finding for

post-advanced, i.e. near native learners of French who also frequently misunderstand prepositions). Why is this so?

My answer to this question consists of two parts. For one, prepositional systems across languages vary to a considerably degree, and this cross-linguistic diversity increases as we move from core, physical senses of prepositions into the metaphoric extensions of prepositional meaning (and let us not forget that metaphor or rather, idiomaticity is one of the main realms of usage with prepositions). The second part of the answer is linked to a large extent to the first problem, and lies in the fact that the portrayal of prepositional semantics in bilingual (but also monolingual) dictionaries (and, more generally, EFL materials), is mostly inadequate, inaccurate, misleading and with mismatched examples (cf. Lindstromberg 1998, 2001; Brala *in press*). This fact additionally contributes to the general sense of chaos linked to prepositional usage, and frequently discourages learners from attempting to master the prepositional system of a foreign language (after a while, they tire of looking up unhelpful or even confusing entries).

As the best way to try and improve the lexicographic representation of prepositional semantics is by fully understanding the structure and the functioning of the prepositional system within the language system, in this paper I will:

a) first take stock of the situation relative to the analysis of prepositional semantics in current (psycho)linguistic studies;
b) by taking as an example two central spatial prepositions, i.e. 'on' and 'in', show that their usage or rather meaning is not arbitrary, but can be clustered around a set of (primitive, bodily based) features;
c) take a look at (the problems in) the lexicographic representations of these two prepositions in English–Croatian dictionaries, and — on the bases of the conclusions reached in the first part of the paper — suggest a possible way for improving the lexicographic portrayals of these two prepositions;
d) test the proposed system for analysing and classifying prepositions by extending it to the English preposition 'at' — a particularly difficult preposition for Croatian learners (and lexicographers working with English and Croatian) as Croatian does not provide a single lexical item that could function as central translational equivalent of the English 'at'. By doing so I hope to provide further evidence in support of the claim that what is being proposed here is a universally applicable system i.e. that it can be of use to lexicographers for the treatment of (spatial) prepositions in general.

Let us begin by introducing some notions that are important for our understanding of prepositional semantics, notions that we will later need our attempt to accomplish the tasks set out above.

Preliminary notions

Prepositions or locatives

The lexical items that fall within the category of prepositions are sometimes referred to as 'locatives'. This is a reflection of the fact that prepositions can be studied from two different perspectives: a) the grammatical, and b) the 'local' (semantically driven). The main part of this paper focuses on the semantics of prepositions, but since there can be no exhaustive semantic account unless we also consider issues relative to the syntax-semantics interface, let us start by observing the most important syntactic facts about prepositions.

From the grammatical perspective, prepositions have, for a long time, been treated as merely 'an annoying little surface peculiarity' (Jackendoff, 1973: 345). This might be at least part of the reason underlying the poor interest for the quality of the lexicographic portrayals of prepositional semantics (which has been dangerously under-examined — cf. Lindstromberg, 2001: 80; Low, 1988: 141–2; Boers and Demecheleer, 1998: 202).

From the perspective of the development of linguistic science, it has been encouraging to note that the attitude towards this word class has changed considerably since the time when Jackendoff was able to challenge the linguistic community by saying that 'people seem never to have taken prepositions seriously' (*ibid.*). The main change has been given by the promotion of the lexical category of prepositions from the category of exocentric (i.e. non-headed) constructions, into that of endocentric (i.e. headed) constructions. This means that from a syntactic point of view, prepositions are now treated on a par with verbs, nouns, and adjectives (they are now seen as projecting like other categories). Looking at things from a semantic perspective, it might be interesting to ask whether the recognition of a new syntactic role could be a symptom of the recognition of a semantic core of prepositions (since, when they were seen as simple 'relators', prepositions were almost completely devoid of meaning). In section 2.2., I will try to show that this has, indeed, been the case, i.e., that prepositions are now seen by an increasing number of researchers as semantically full elements. Yet — and we now get to the main stimulus behind this paper — this fact has not been recognised by lexicographers, i.e., it has not been reflected in the quality of the lexicographic portrayal of prepositional semantics (which, to a large extent, still seems to be based on intuition rather than on now existing more accurate semantic findings).

The meaning of the word class

As already noted, linguistics has, for some time now, been familiar with the idea that syntactic categories express certain semantic traits which are common for all members of a given syntactic category (e.g. Talmy,

1983, 2000; Slobin, 1985, Levin and Pinker, 1991). Is it then possible to establish a 'general meaning' for prepositions, i.e. the word-class as such? If we take a look at one of the traditional grammar reference books, we read that 'a preposition expresses a relation between two entities, one being that represented by the prepositional complement.' (Quirk, 1985: 673).

If prepositions are, by definition, relational words, then in order to understand the nature of their meaning, i.e. of the type of relation they can establish, we need to stop for a moment and think about the sort of things they put into relation. The simplest type of prepositional spatial expression is composed of three constituents, i.e. the preposition and two noun phrases (NP), as in:

> 'the spider on the wall'

The two NP-s are referred to in the literature by various names ('theme', 'located entity', 'located object', 'spatial entity' … for the first NP, and 'reference object', 'reference entity', 'localiser', 'landmark' … for the second NP). The terminology adopted in this paper is: **Figure** (abbreviated as 'F') for the first NP, i.e. the object being located, and **Ground** (abbreviated as 'G') for the second NP, i.e. the object in reference to which F is being located. The notions of Figure and Ground were originally described in Gestalt psychology, but their application in linguistics stems from Talmy (1983), who characterised them as follows:

> The Figure is a moving or conceptually movable object whose site, path, or orientation is conceived as a variable the particular value of which is the salient issue. The Ground is a reference object (itself having a stationary setting within a reference frame) with respect to which the Figure's site, path, or orientation receives characterisation (Talmy, 1983: 232).

Given that a preposition seems to relate F's location with respect to G (F's location being static in the case of locational prepositions and dynamic in the case of motional ones), we might easily be led to conclude that the relation established by a preposition (as word class) has a locational or topological nature. But let us contrast:

> 'F (is) above G.' *vs*. 'G (is) above F.'

While it would be possible to view the two sentences as differing only in expressing a different (reversed) location of F and G (thus the preposition having a pure topological character) I would like to hypothesise that the difference between F and G in the two sentences is much deeper, with the

semantic contrast residing in a differently profiled conceptual content (cf. Langacker, 1987), with the profiling being **functionally** motivated. Here is what I mean.

To begin with, let me explain the reasons which make me believe that 'above' in '*F (is) above G.*' and '*G (is) above F.*' does not establish a topological relation. Let us consider:
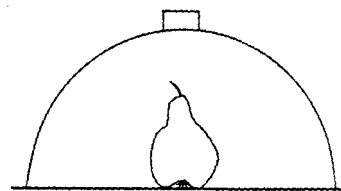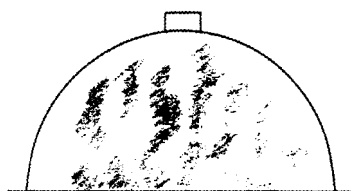
1)'The smoke is in the cheese cover.'   2) The pear is *in/under the cheese cover.' [1]

Topologically, the relations between the smoke and the cheese cover in (1), and the pear and the cheese cover in (2), look very much alike. However, the problem of the unacceptability of the preposition 'in' in (2) (unacceptable also in Croatian), is easily resolved within the cognitive framework, which takes into account features that result from our functioning as and interacting with entities in the world. 'Containment' is a good example of an interactive relation established between entities (including ourselves) in the world. 'Support' is another one. While in (1) the cheese cover controls the location of the smoke, in (2) it is not the cheese cover (in terms of 'containment'), but rather the table (in terms of 'support') that controls the location of the pear. So in (2) we have to say either that 'The pear is on the table', or, with respect to cheese cover, that it is 'under', but in no case 'in' it. It is hence not 'location', but rather 'the function of **controlling** *location*' that seems to be at the core of prepositional semantics. This is a crucial point, one which we shall return to in 3.1.

Another theme is pervasive through most of the accounts of prepositional meaning: prepositions do *not* link objects, but rather *geometric descriptions* of objects (Herskovits, 1986), different conceptualisations, i.e. *views of objects* (Leech, 1969; Fillmore, 1971; Bennett, 1975) or, as shall be suggested in the next section, views or abstractions of *parts of objects*. An easy way to understand what is meant here is by attempting a mental exercise whereby F and G are kept constant and only the preposition is replaced (e.g. 'frog in grass' vs. 'frog on grass').We see that the mere change in preposition forces a particular type of construal on the scene.

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[1] Sentence (1) is taken from Vandeloise (1986: 233), and sentence (2) from Herskovits (1986: 16).

Before moving on, let us take stock of the situation by noting that the notions of 'function of control' and 'schematization' represent the main ideas underlying and guiding our analysis.

The meaning of 'on' and 'in'

Understanding 'on' and 'in'

Let us now try and exemplify what does all the above means in practice, i.e. let us attempt a cognitively grounded semantic analysis (for lexicographic purposes) of 'on' and 'in'. But first, I'd like to motivate my choice of prepositions:

1) 'in' and 'on' are the two prepositions that have most extensively been dealt with in the literature;
2) on the basis of their treatment in the relevant literature, 'in', and 'on' seem to have quite a clear 'prototypical' or 'ideal' meaning, and are frequently referred to as 'the two basic topological prepositions' (cf. Herskovits, 1986: 127; Leech, 1961: 161), or 'central locational prepositions' (cf. Quirk, 1985);
3) 'in', and 'on' (just like their counterparts in the other languages under examination) are the most frequently used prepositions (be it as independent lexical items, as verb particles or prefixes);
4) 'in' and 'on' fall in the middle range of semantic complexity, on a continuum between e.g. 'toward(s)' and 'by' (cf. Lindstromberg, 2001: 83, who also points out that entries in the middle range of semantic complexity are best candidates for linguistic studies for lexicographic purposes);
5) 'in' and 'on' are the first prepositions to be acquired by children (and, cross-linguistically speaking, the same is true of other words in other languages expressing the concepts of 'containment' and 'support');

I would like to point out here that the ultimate objective of my study is not to provide a simple inventory of spatial relations that are profiled by each preposition, but, rather more ambitiously, to try and get to the universal realm by, eventually, replacing the question 'what are the profiled relations' by the more ambitious question 'what relations are profilable?'[2]. I am fully aware of the fact that by looking only at a couple of prepositions I cannot really make any definitive claims about the profilable relations. However, my intention is to propose a thorough exercise in cognitive semantic

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[2] In fact, such a move is, in my view, indispensable (cf. also Hawkings', 1993: 328, critique of Langacker's, 1987 Cognitive Grammar (CG) program for its self-imposed limitation boiling down to the claim that the search for universals among the inventory of profiled structures is outside the scope of CG.)

decomposition (i.e. a framework), and suggest a set of primitives that could, subsequently, be probed in other linguistic contexts and explored in other languages.

Searching through the literature, looking for studies that have most influentially dealt with the issue of prepositional semantics, and more importantly for our analysis, trying to find elements which could help us systematise prepositional usage (cross-linguistically), I found nine analyses which seem to be particularly useful for our purposes. In chronological order, they are: Cooper (1968), Leech (1969), Bennett (1975), Quirk (1985), Herskovits (1986), Vandeloise (1986, 1998), Bowerman and Pederson (1992), and Lindstromberg (1998). It might be interesting to note here that, when ordered chronologically, the above studies could be said to reflect the shifts in climate regarding the relation between language and cognition. In fact, while older, i.e. 'classic' frameworks (e.g. Cooper, Leech, Bennett, Quirk) generally tend to exhibit a high degree of formality and linguistic autonomy, in the late 80's and in the 90's we have a number of more cognitively based accounts of prepositional meaning (e.g. Herskovits, Lindstromberg, Bowerman, Pederson and Vandeloise). While this can be seen as a reflection of new times in which an increasing number of scholars believe that questions about meaning will get their answers directly from answers to central issues regarding the workings of the human mind, we might also want to observe, once again, that this view, while having become very influential in (psycho)linguistic studies (of prepositions) has not yet been exploited by lexicographers.

Now, going back to the frameworks introduced above, it should be noted that although the mentioned researchers do not come up with a single explanation or, in the case of the cognitive approaches, with a single mental structure that could be said to constitute the meaning of a given spatial preposition, most (see overview in Brala 2000, Lindstromberg, 2001) seem to agree on the following:

a) all prepositions are to some extent gestalt-kinetic in their nature (comparable to our 'function of control' introduced in 2.2. above); and
b) all prepositions are sufficiently endowed with definable geometrical and functional structure as to enable (motivated, non-random) metaphorical extensions (comparable to the notion of 'schematisation' introduced in 2.2.).

In relation to b) we note that while linguists seem to keep offering increasing evidence supporting the claim that prepositional metaphor is hugely important for the purposes of our understanding the structure of language (cf. also Lakoff, 1987; Lakoff & Johnson, 1980), very few researchers ask the question which, in my view, should be looked at before we attempt to tackle metaphor: where and how do we search for the basis of

metaphor, the core meaning; how do we go about finding and understanding the starting point and the 'operational mechanisms' of metaphor (as unless this is done, analysing metaphor will remain going round in a vicious circle — cf. Brala, *in press*).

Out of all the studies mention above, the one that, in my view, offers what could be the starting point on the road to answering this crucial question of the 'basis of metaphor' is a cross-linguistic study of prepositional usage by Bowerman & Pederson (1992; cf. also Bowerman & Choi, 2001: 484–7). In this detailed study the authors examine the physical (spatial) senses lexicalised by the English prepositions 'on' and 'in', and the ways in which these same senses (i.e. types of spatial relations) are rendered in 33 other natural languages. Bowerman & Pederson aptly show that all the instances of spatial relations under consideration can be divided into 11 categories, with categorial boundaries being drawn whenever at least one language, in order to lexicalise one or more of these spatial relations, 'switches' from one preposition (or other lexical form)[3] to another. Even more interestingly, the authors observe that these categories can be ordered as to form the following sequence:

Support From below	Marks on a surface	Clingy attachment	Hanging over / against	Fixed attachment	Point – to – point attachment	Encircle with contact	Impaled / spitted on	Pierces through	Partial inclusion	Inclusion
E.g. Cup on table	*Writing on paper*	*Raindrops on window*	*Picture on wall*	*Handle on cupboard*	*Apple on twig*	*Ring on finger*	*Apple on stick*	*Arrow in / through apple*	*Cigarette in mouth*	*Apple in bowl*

Fig. 1: *The ON-IN scale of spatial meaning categories (Bowerman & Pederson, 1992. Cf. also Bowerman & Choi, 2001)*

This ordered sequence of meaning categories, is, at a cross-linguistic level, differently partitioned into meaning clusters. E.g. Spanish and Portuguese lexicalise the whole range with one preposition only ('en', and 'em' respectively), English uses two prepositions ('on', and 'in'), while German and Dutch partition the scale into three 'prepositional segments' ('auf', 'an' and 'in' for German, 'op', 'aan', and 'in' for Dutch), etc. The most striking observation is that the portions of the scale attributed to different prepositions are 'compact', i.e. there is no language which would lexicalise part of the scale with 'on', then part of the scale by 'in', and then part of the

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[3] The study by Bowerman and Pederson is not about prepositions *per se*, but about the expression (or rather, semantic categorisation) of 'ON' and 'IN' spatial relations in natural languages. Thus, apart from considering adpositions (as the lexical form most frequently used for the expression of the on-in relation) the authors also consider spatial nominals (used in, e.g., Japanese and Korean), and case endings (used, e.g., in Finnish). However, for the purposes of our paper and the language under consideration. i.e. English, we will talk only about prepositions. It should also be pointed out that the entire analysis by Bowerman & Pederson has been done for F (figure) located in relation to G (ground), and that reversing the relation often affects the lexical choice (frequently, the preposition needs to be changed when F and G are reversed).

scale by 'on' again. If there is overlapping at all (i.e. if a language uses two prepositions interchangeably for one or more categories) this always occurs in the section of the scale which is 'transitional', i.e. between the categories in which the use of only one of the two prepositions is possible.[4] All this lead to the hypothesis that the ON-IN scale is not formed on a random basis, but that there must be an underlying 'gradient', something more powerful than 'linguistic arbitrariness' governing the formation and arrangement of its categories.

Departing from this observation, in my Ph.D. research (Brala, 2000), I set out to try to understand what this 'something' might be. After a thorough literature review, extensive cross-linguistic probing, and two experimental case studies, my conclusion is that the categories of spatial relations are formed (and later organised into meaning clusters) on a combinatorial basis, out of universal, primitive, bodily-based semantic features. The latter are viewed as being shared between the human language faculty and other sub-systems of human cognition (cf. Talmy, 2000). What exactly is meant by this and how can this be related to the lexicographic portrayals of prepositions?

In order to try and satisfactorily answer this question, we need to recall a notion introduced in 2.2., i.e. the notion of 'function of control' as the element at the semantic core of prepositions. Next, we note that Bowerman & Lindstromberg, while making extremely perceptive observations relative to the cross-linguistic clustering of prepositions, treat the single categories ('support from below' through 'inclusion') as being topological (which is exactly what most researchers do when trying to analyse prepositional meaning). However, in my view, a topological reading of preposition conceals the most important *gestalt*-kinetic elements of their semantics, allowing only the reading of their 'geometrical' elements of meaning. This problem can be solved if rather than treating prepositions as topological configurations, we start treating them as *functional configurations*. Before moving on, I would like to point out the only proposal in the literature which treats prepositions as functional configurations is that by Vandeloise (1986, 1998).

Analysing prepositional semantics from a functional perspective yields an entirely new reading (or rather understanding) of prepositions; for the *word class* as such, we phrase the meaning of the relational lexical unit PREPOSITION in terms of the following question: in terms of which features does the Ground (G) *control* the location of the Figure (F)? The answer to this question determines the choice of the preposition. This simple formula easily explains the suggested perceptual difference in the construal

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[4] E.g. in Hindi, categories 5 — fixed attachment, and 6 — point-to-point-attachment, can be lexicalised by two prepositions: 'per' or 'me'. Categories before category 5 are lexicalised by 'per' only, categories from category seven — by 'me'.

of the Ground noted in 2.2. between 'frog in the grass', *vs.* 'frog on the grass'; for 'in' to be a possible lexical choice, G needs to control the location of F in terms of *voluminosity* (see below), whereas for the English 'on' G controls the location of F in one of its (G's) axes (usually the horizontal or the vertical). We thus have the perceptual 'adjustment' (or a specific conceptualisation) of the Ground on a particular occasion of speaking, whereby G's features that are triggered by the given preposition (i.e. the features forming that prepositional lexical pattern), gain prominence. Such a 'mapping' of features between lexical patterns and referents would apply to language as a system, including its metaphoric devices. What we, then, need, is to try to discover the set of basic, atomic features, and then extend our analysis as to include lexical patterns and other linguistic mechanisms that can be performed on these features. Is such a task feasible?

The conclusion reached in Brala (2000) is that the 'on'-'in' range of static spatial meanings can be explicated in terms of varying combinatorial patterns of different values (or features) within the following three domains:[5]

- DIMENSIONALITY (a domain relative to the number of axes of G that are taken into consideration for the purposes of linguistic expression), yielding (for the purposes of explanatory needs of the range of prepositional usages under consideration) four features, i.e.: 1DIM (one-dimensional), 2DIM (two-dimensional), CIRCLE, and 3 DIM (three dimensional or 'containment proper'). Schematically, this looks as follows:

Support From below	Marks on a surface	Clingy attachment	Hanging over / against	Fixed attachment	Point – to – point attachment	Encircle with contact	Impaled / spitted on	Pierces through	Partial inclusion	Inclusion

1DIM   2DIM   CIRCLE   3DIM

Fig. 2: *The ON-IN gradience scheme analysed in terms of DIMENSIONALITY*

- ORIENTATION (a domain which does not yield features, but is based on the simple opposition between '+', i.e. 'present' *vs.* '-', i.e. 'absent'). 'Orientation present' refers to the 90° or the 180° angle with respect to the Earth's force of gravity (as exercised on G). Thus the reading is: 'parallel or perpendicular to the force of gravity',

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[5] Following Lakoff's (1987:93) proposal of the 'domain-of-experience-principle', the term 'domain' is here used to refer to basic patterns of neural activation which 'mean' without being propositional.

when the domain is '+', or just 'inclined with angle irrelevant' when the domain has the '-' value[6]; and

- ATTACHMENT — conflated with boundedness — since their separation seemed to complicate the picture without any gains at the explanatory level — the domain of 'attachment' is best understood as the quantity of attachment between G and F that seems to be relevant for lexicalisation. This domain seems to yield two features: ATTACHMENT (simple contact or attachment via man-made means such as screws or glue) and 1 SIDE BOUNDED ATTACHMENT[7].

These eight features (which yield different schemata that, in turn, have a different force-dynamics realisation of G's function of control over F's location) now enable us to systematise the cross-linguistic variation in the 'on-in' range of spatial usages, as shown in Fig. 3.

Support From below	Marks on a surface	Clingy attachment	Hanging over / against	Fixed attachment	Point – to – point attachment	Encircle with contact	Impaled / spitted on	Pierces through	Partial inclusion	Inclusion
1DIM +OR ATTCH	1DIM - OR ATTCH	2DIM -OR ATTCH	2DIM + OR. ATTCH	2 DIM - OR. ATTCH	2 DIM + OR. 1SBATTCH	CIRCLE - OR ATTCH	3DIM F - OR ATTCH.	3DIM G - OR. ATTCH.	3DIM - OR. 1SBATTCH	3DIM

Fig. 3. *The'on'-'in' scale decomposed into cognitive, bodily basic features*

Before moving on, into the core of our study where we will try and see if any of the above can be of use in lexicography, let us just note that the above division is interestingly paralleled by some results from studies of the brain, i.e. plenty of neurobiological evidence (cf. Bloom et al., 1996; Deacon, 1997).[8]

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[6] This domain bears an interesting relation to some recent studies in human perception (cf. e.g. Gregory, 1998) suggesting that human beings are **inclined** to perceptually adjust slightly leaning objects to 90 or 180 degrees).

[7] The logically needed feature '2 SIDE BOUNDED ATTACHMENT' has been conflated with '3 SIDE BOUNDED ATTACHMENT' which, in turn, is conflated with the '3 DIM' or 'VOLUME' or 'CONTAINMENT PROPER' feature within the domain of dimensionality, thus leaving the domain of attachment with two features only. It is, furthermore, important to note here that there seems to be an important 'force-dynamics' relation between the feature ('quantity' / 'quality' of) attachment and the feature 'orientation'. In fact, the more inherent (tight, extended) the attachment between F and G, the lesser the influence of the Earth's force of gravity on the location of F.

[8] It has been shown that
   a) spatial information in the brain is modal (we seem to have representations or maps of motor space, haptic space, auditory space, body space, egocentric space, and allocentric space; cf. Bloom et. al., 1996). We note that the primitive, bodily-based features proposed here as the bases of prepositional semantics, seem to mirror the

Translating 'on' and 'in'

The most widely used and generally held to be the most reliable English-Croatian dictionary is the 'Englesko-hrvatski rjecnik' by Filipovic (EHR in the remainder of the text). The dictionary was first published in 1955, and the edition that I am using in this analysis is the 1996 (i.e. the latest) one. However, having checked the editions that have come out between 1955 and 1996 (i.e. twenty), it has been disappointing to note that the lexical entries under 'on' and 'in' have remained unaltered for the past 40 years.[9] It is as if, from the perspective of EHR's compilers (and in terms of satisfying the needs of EHR's users), the understanding of semantics and lexicography did not improve at all over that, pretty long, period of time.

The above problem becomes particularly grave when related to two observations (already spelled out above), i.e.:

a) the fact that prepositions have notoriously been difficult for (E)FL learners;
b) the fact that the representation of 'on' and 'in' in the EHR is chaotic, vague and misleading;

By taking a look at the prepositional entries under 'on' and 'in' in the EHR, I would now like to offer proof for my latter claim.

If we turn to page 744 of EHR, we read:

> **on** [ɔn] *prep*. **1.** equivalent to the Croatian 'na' (central meaning shared with English 'on'), e.g. *on the wall* (rendered with the Cro. 'na'), *on the piano* (Cro. 'na'), *on foot* (Cro. 'pješice' – lit. 'walking'); Cro. 'kod', 'pri' ('next to', 'by', 'at') *have you a match on you*?, *on the Times* (rendered as 'he workes at the Times), *on sale* (rendered as 'na prodaju' – lit. 'for sale'), *on my honour* (casti mi); **2.** equivalent to the Croatian 'na temelju', 'zbog' ('on the basis'/ 'grounds', 'because'), e.g. *to live on annuity* (rendered as 'zivjeti od rente'), *imprisonment on suspicion* (pritvor na temelju sumnje); **3.** equivalent to the Croatian 'tik do',

cognitive multi-modality of spatial perception (i.e. 'contact' would mirror haptic space, 'gravity' — body / motor space, and 'orientation' — motor / visual space); and
  b) neural information about space does not include (detailed) representations of objects (in space), i.e. there seems to be a clear (although not total) separation between the neurobiological 'what' and 'where' systems. With respect to this we might wish to recall a very insightful analysis by Landau and Jackendoff (1993), discussing the divisions between the *linguistic* 'what' and 'where' systems, as well as Talmy's (1983: 227) or Slobin's (1985) proposals suggesting that the 'what' system is expressed by open class words, whereas the 'where' system is lexicalised by the closed class portion of language.

[9]There were a couple of examples added under 'in', examples of usage of the English 'in' that are rendered in Croatian by prepositions other than 'u' (central 'in'). These additions did little other than adding to confusion.

'na', 'uz', prema' (lit. 'right next to', 'on', 'by', 'toward'), e.g. *house on the shore* (rendered as 'kuca uz obalu' – lit. 'house by the shore'), *they marched on London* (rendered as 'oni su posli prema Londonu' – lit. 'they left for London'), *this is on me* (rendered as 'to ide na moj racun' – lit. 'this goes on my bill'); **4.** in expressions of time; equivalent to Croatian 'na'; *on the third of May* ('3. svibnja'), e.g. *on Sundays* ('nedjeljom'), *on Sunday* ('u nedjelju' – lit. 'in Sunday'), *on further consideration* ('nakon daljeg razmisljanja' – lit. 'after further thinking'); 'neposredno iza' ('right after') *on publication* (rendered as 'odmah nakon objavljivanja' – lit. 'right after publication'); **5.** equivalent to Cro. 'o', 'u vezi sa', 'nad' (lit. 'against', 'in relation to', 'over'), e.g. *to think on* (rendered as 'razmisljati o' – lit. 'to think about sth.'), *work tells severely on him* ('rad mu jako skodi' – lit. 'work does him a lot of harm'); **PHRASES**: *on an average* (Cro. 'u prosjeku' – lit- 'in average'), *on the contrary* (Cro. 'naprotiv' – lit. 'contrary'), *on the whole* (Cro. 'u cjelosti' – lit. 'in the whole'), *on purpose, on the instant* (rendered as Cro. phrases without a preposition).

Turning, next, to page 559 of the EHR we find, under 'in', the following:

in [in] *prep.* **1.** mainly locational, answers the question 'where?' – equivalent to the Croatian 'u' ('in'), 'na' ('on') e.g. *in Europe* ('u' Evropi – lit- 'in'), *in the East* ('na istoku' – lit- 'on the East'), *in the house, in London, in Paris* (rendered with the Cro. 'u', - in), *in the street, in the country, in the window, in the sky* (rendered as 'na ulici' – lit- 'on the street', 'na selu' – lit. 'on the country', 'na prozoru' / 'na nebu' – lit. 'on the windon / sky'); **2.** metaphoric - equivalent to the Croatian 'u', 'na', 'pri' ('in', 'on', 'at'/'by'/'next to'), e.g. *in the army, a professor in the university, in the play, in Shakespeare; blind in one eye, not one I a hundred, a place in a million, a shilling in the pound, in old people, ... in good health* (all phrases are translated with Cro. phrases, not grouped in any way); **3.** state, condition – *in good health, in despair, in arms, in any case, in no way, nouns ending in* (Croatian equivalents given, no grouping in any way); **4.** time – *in 1900* ('godine 1900. – lit. during the year 1900), *in March* ('u ozujku' – lit. 'in'), *in the day / daytime* ('po danu' – lit. 'during') …
5. manner, means, relation – *a ride in a motor car* ('voznja autom' – lit. ride by car), *in one word* ('jednom rijecju' – lit. with one word), *in short, in dozens, cut sth. in two ...* (varied translations into Cro., no system); **6.** degree, measure – *3 feet in length* ('3 stope u daljinu' – lit. same as English), *in size* ('po velicini' – lit. 'by size'), *six in number* ('setoro na broju' – lit. six on number) … **7.** reach – *in my power* (Cro. same as Eng.); **8.** cause, purpose – *in my defence, in his honour,* (both rendered in Cro. with 'u' – 'in'), *in remembrance* ('na uspomenu' – lit. 'on'); **9. phrases** – *in that time, in as far as, in itself* (all rendered by 'opaque' Croatian phrases, no prepositional usage in Croatian).

What is the picture of 'on' and 'in' that a Croatian EFL learner gets when s/he looks up the above entry? In one word – confusing! First, the student sees that each of these two English prepositions can be rendered in Croatian by a myriad of Croatian prepositions ('na', 'u', 'pri', 'zbog', 'od', 'uz', 'prema', 'nakon', 'iza' … in the case of the English 'on', and 'u', 'na', 'pri', 'uz', 'po' … in the case of 'in', and this does not include the set phrases). This, notwithstanding the compilers' attempt of subdividing the entry into a number of core divisions (5 + phrases in the case of 'on', even 8 + phrases in the case of 'in') results in the EHR's semantic portrayal of these two prepositions being completely chaotic i.e. jumbled, and even inaccurate, e.g.:

a) 'on the Times' rendered as '(he works) at the Times' – the English 'at' and 'on' are confused in the source language;
b) 'on sale' rendered as 'for sale' – no distinction is made between selling something (at a regular price) and selling it at a discount price;
c) 'house on the shore' rendered as 'house by the shore' – the former should have been rendered by the Croatian 'na' ('on');
d) 'they marched on London' – rendered as 'towards London', while it should have been 'na' ('on') London;
e) 'a professor in the university' (location) is confused with 'professor at the university' (functional coincidence) …

We could keep listing examples, all along similar lines, but the above should suffice to describe the sort of problem encountered in the EHR's portrayal of the English 'on' and 'in'.

In sections 2 and 3.1. of this paper we have reviewed some of the latest developments in the linguistic treatment of prepositional semantics. Can the new developments and conclusions be of any use for solving the types of problems just spelled out above? My answer is yes, and below I will try and explain why I maintain so.

As seen above, (spatial) prepositions can be clustered around a number of features. Since the clustering (analysed for the 'on'-'in' range of spatial usages in 3.1.) is cross-linguistic, it can be seen as a concept that people across languages can relate to. It would thus make sense to view such an analysis in terms of (primitive, universal, cognitively motivated) feature based clusters as a possible way to make (lexicographic) sense out of 'prepositional madness', i.e. as something that lexicographers could make use of in their classification and discussion of prepositions.

More concretely, an analysis of the type illustrated for 'on' and 'in' in Fig. 3 gives us the tools needed to systematically and thoroughly compare, contrast and describe prepositional usage cross-linguistically. A very important thing to note here is that this is true of spatial as well as of metaphorical language; namely, albeit being derived from an observation of lexical items pertaining to spatial i.e. physical relations, the semantic features proposed in 3.1. can nicely be mapped onto non spatial and, more generally, metaphorical usages of prepositions (since they represent the 'point of departure' for metaphor; cf. also prepositional usage with 'temporality' below).

Given all the above, we may want to conclude that a lexical representation of a preposition based on a cognitive semantic analysis of the type proposed above would a) need to first give an exact description of the gestalt-kinetic type of the relational function established by that preposition[10]; b) provide a

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[10] It has been shown, namely, that explicit descriptions of meaning (followed by examples) seem to be particularly useful after the 'critical period' (and most users of bilingual

subcategorisation of usage types based on (universal) schematic elements. Ideally, we would like to have the (usage) subdivisions semantically motivated and (cross-linguistically) coherent, where every new subcategory would highlight (all and only) those semantic traits of a given preposition that have been reflected at the surface i.e. lexical level (in terms of drawing distinctions between two languages, i.e. determining a 'change' from one preposition to another either intra- or inter-linguistically).

To give an example, I would then like to suggest a possible way of rewriting the portrayals of the English prepositions 'on' and 'in' in an English-Croatian dictionary as follows:

'on' is *prep*. Central meaning: locate X with respect to Y, so that Y supports X (prevents X from falling) in terms of one of Y's axes (usually horizontal or vertical). There is always (at least minimal) contact between X and Y. Examples of usage: **1.** support in the horizontal axis (*vase on the table / piano / floor* … all rendered with the Croatian 'na' – 'on'); **2.** support in the vertical axis (*picture on the wall / handle on the door* … all rendered with 'na' – 'on'); **3.** point to point attachment (in any direction) (*spikes on hook, cross on a chain, dog on leash* … this category allows **in all cases** for a translation into Croatian either by using the preposition 'na' ('on') or, more appropriately 'o' (≈ 'against') (i.e. 'kopacke **o** klinu', 'kriz **o** lancicu', 'pas **o** uzici'); **4.** circular Y supported by X (*ring on finger* – Cro. 'na'); **5.** time – time is divided into 'prepositional segments' from 'at' to 'in' depending on whether the 'configuration in time' **a)** is very accurate i.e. 'coincidental with a precise time' (when we have 'at' – with hours, 'at 5pm'), **b)** can be located 'on' a time-axis (when we have 'on' – with days, e.g. 'on Monday'), **c)** can be said to be contained by a 'larger' period of time (when we have 'in' – with months, years, and centuries); Croatian always has 'u' ('in') apart from year (no preposition); **6. [phrases] -** it is probably not a bad idea to give a list of 5-10 most frequent 'on' set phrases, followed by Croatian set phrase translations. It should however be pointed out that idioms do follow a general idea of 'X is on Y' where Y 'supports' X in some way (either literally or metaphorically) (cf. Lindstromberg, 1998).

Moving, next, to 'in' we might have something along the lines of:

'in' is *prep*. Central meaning: locate X with respect to Y, so that Y controls the location of X in terms of its (Y's) voluminosity (total or partial → 'gestalt completion'). Examples of usage: **1.** inclusion (apple in bowl, letter in drawer – always rendered in Cro. by 'u'); **2.** partial inclusion (cigarette in mouth) – 'u' ('in'); **3.** time (it would probably be sensible to repeat the whole explanation relative to the English usage of preposition with time, as it makes sense only as a whole, while at the same time not being too long,

dictionaries are beyond it), and raising learners' awareness via explicit routes, has proven particularly useful in SLT (cf. Lindstromberg, 1998: 99; Ellis, 1997: 84–5).

i.e. space consuming); **4. [phrases]** - same reasoning (with 5-10 most frequent English 'in' idioms) as with 'on' (*in a document / play / excitement / in his thirties* – always 'containment').

It is important to note that this exercise is not intended as an end to itself. As pointed out in 2.1., the objective of my analysis is not that of describing the relations profiled by a single preposition (or, for that matter, by two or three of them), but rather, more ambitiously, it is ultimately intended as a description of *all profilable relations*. In simpler terms, the goal is to find and describe all the gestalt-kinetic configurations whereby G can control F's location (for the purposes of verbal expression, of course - such as 'opposition to the force of gravity' i.e. 'orientation', 'coincidence', '(concrete) definiteness' etc.) as well as to try and identify all the various schematizations (or rather schematic elements, such as points, lines, planes i.e. axes etc.) in terms of which these various gestalt-kinetic, functional configurations are 'described' or rather 'recognised' (communicatively signalled) for linguistic purposes (in a varying but systematic way across languages of the world). The list of these features (relative to both functional configurations and schematic elements) would then in the end represent the universal inventory around which prepositions (variously, but systematically) cluster at a cross-linguistic level in terms of their (spatial but also metaphoric) usage. Finally, since such a description in order to be valid would need to hold cross-linguistically it should also represent a useful tool for lexicographers in their discussion and classification of (spatial) prepositions.

Testing the system – the prepositions 'at'

In order to take things a step further, I would now like to see whether the system proposed for analysing and portraying 'in' and 'on' can be applied for the treatment of the English 'at'. I chose this particular preposition as it is probably the most difficult (opaque) preposition for Croatian learners. Croatian, namely, lacks a single lexical item that could render at least the central meaning of the English 'at' (the sort of central translational equivalent of the type that the Croatian preposition 'u' is for the English 'in' and 'na' is for 'on'). As such, 'at' seemed to be a particularly demanding entry, and thus a very good one for probing the proposed lexicographic solutions.

Let us start by summarising what (cognitive) semanticists have seen as being the core elements of the meaning of the (English) preposition 'at':[11]

a) with 'at', G controls the location of F in terms of 'at' expressing the fact that F is *coincident* with G; (this is its gestalt-kinetic configuration, conflating the elements of attachment and orientation)

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[11] For a complete overview see Brala (2000).

b) in order for coincidence to be possible (and perfect, else it would not be coincidence[12]) F and G are being treated as 'point-like' (this is the 'value' of 'at' in schematic terms, more precisely in terms of dimensionality — since we always treat F and G as 'point-like' we have *'zero-dimensionality'*).

'At' can, thus, be said to lexicalise a situation in which a point-like F is made to coincide with a point-like G. Furthermore (and here comes the basis for our subcategorisation of 'at') G is always either locationally, temporally, functionally or 'quantitatively' precisely 'defined' (cf. Lindstromberg, 1998). Namely, there seem to be four different subcategories that 'coincidence' and 'zero-dimensionality' extend into:

a) 'at' of spatial coincidence — precise coincidence of two points, frequently at a point 'along a route';

b) 'at' as directional coincidence — interpreted for the 'Ground as focus' uses of 'at' (look at, throw at, kick at, work at …). Here, F is a source of a vector (associated with the primitive notion of force-dynamics — cf. Bowerman, 1996), which is coincidental with the FG axis (basically, a straight line between F and G); Most 'at'-s in phrasal verbs fall into this category.

c) 'at' as functional coincidence — for all cases where G is made coincidental with the activity (work, play, fight) carried out in terms of G's functional potential (functioning as a 'function-site' (school, restaurant, hotel), a battle-field, a tool etc.).

d) 'at' as temporal coincidence — simply, 'at' used with exact points in time expressed in terms of hours (and / or minutes).

Can this help us in any way when trying to portray the semantics of the English 'at' in English-Croatian dictionaries? In order to give an answer to this question we first need to see how is the meaning of the English 'at' is currently rendered in EHR. If we turn to page 57 of EHR we read:

> **at** [æt] *prep* **1.** (place lit. & fig.) *at school* (rendered with the Cro. 'u' – in*); at the door, at home* (Cro. 'kod' – by); *at a proper place, at the head of* (Cro. 'na' – on). **2.** (time) *at two o'clock, at the same time* (Cro. 'u' – in); *at Easter* (Cro. 'oko' – around). **3.** (state, condition) *at a gallop, at best, at most* (Cro. 'u' – in); *at liberty, at peace* (Cro. 'na' – on); *at hand, at work* (Cro. 'pri' – by). **4.** (origin) *at our hand* (Cro. 'iz' – out of). **5.** (amount, price, number) *to sell at a price* (Cro. 'uz', 'po', 'na' – 'by' (spatial), 'by' (numerical), on). **6.** (direction, movement lit. and fig.) *arrive at Oxford, arrive at a place, aim at a mark* (Cro. 'u', 'na' – in, on) **/ [phrases]** at all events, at best, at first, at home, at last, at least, at most, at one, I'll take it at that, at times, not at all, at any rate, at hand, at once, at any price, at a time, to be good at, to be hard at it, and … at that, at close quarters, to

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[12] Let us recall that while 'F can be *partly* on / in G', it (i.e. F) **cannot** be '*partly* **at** G'.

be at something. The phrases are translated mostly with adverbials and Croatian
set phrases.

As with 'on' and 'in', we are once again faced with a very chaotic lexicographic representation of the English 'at'. In fact, the main information that a user of the EHR gets when s/he looks up the above entry is that 'at' can mean any of the seven prepositions listed as the possible translations of 'at' (i.e. 'u', 'kod', 'na', 'oko', 'pri', 'uz', and 'po' — not counting the translations of the phrases). Next, and probably even more dangerously, apart from being unsysterous, the entries under 'at' i.e. its translations into Croatian are particularly inaccurate (perhaps due to the already mentioned fact that there is no single translational equivalent that would render the core sense of the English 'at'). Here are just the most striking mismatches:

a) *'at the door'* (under 1 - rendered by Cro. 'kod' — Eng. 'by'; should have been 'na', i.e. 'at');
b) *'at work'* (under 3 - again, rendered by Cro. 'kod' — Eng. 'by'; should have been 'na', i.e. 'at');

In both these examples, the compilers fail to recognise the difference between the feature 'proximity' (rendered by the use of 'kod' — 'by'), and coincidence (rendered, much more precisely, by 'na' — 'on'). Furthermore:

c) under 2, in *'at Easter'*, we have an even more worrying example of mismatched translation. In fact, while our observations under a) and b) above can be said to be inaccurate, but possible, 'at Easter' translated as 'oko ('around) Uskrsa' is totally wrong, as English, too, gives us the possibility of having 'around Easter', as a semantically different idea than 'at Easter'. The precision of the latter phrase can easily be rendered in Croatian by saying 'na (or, alternatively, 'za') Uskrs', which should have been listed as the translation equivalent of 'at Easter', giving a precise temporal collocation as coincident with the time of Easter;
d) the entire entry under 4, i.e. 'origin — *'at our hand'*, rendered by the Croatian 'iz' ('out of'), is very much opaque. My only guess is that it has been put there to signify something along the lines of 'at hand', illustrating the 'boundary as coincident point' of the semantics of 'at' (discussed in 2.1. above), which, too, can be rendered in Croatian by 'pri' ('meaning by'). There is a nice example of 'at hand', translated into Croatian by 'pri ruci' (meaning that something is easy to access, i.e. ready for use – link to 'functional coincidence' of at). Giving a source ('iz' – 'out of') rather than a (coincidental) boundary interpretation of this type of 'at' is, again, completely wrong and misleading;
e) entry under 5, with amount, price and number, the first translation equivalent suggested for 'at' is 'uz', meaning, literally, 'by'. This, again, apart from being wrong with amount, price, and number, is misleading in the sense mistaking 'proximity' for 'coincidence' ('po' — 'by', and

'na' — 'on', are much more central as translation equivalents of 'at' as used with amount, price and number);

f) finally, in 6, *'arrive at Oxford'* rendered by 'u' is a mismatched translation, since 'u' ('in') is physical, and would be the equivalent of 'arrive *to* Oxford' ('stici *u* Oxford). Arriving 'at' Oxford (with a strong functional semantic component, where Oxford is thought of in terms of its being a university), is much more accurately rendered in Croatian by saying 'stici *na* Oxford' (which is the only way of implying the functional, i.e. institutional aspect of Oxford).

Point f) above is particularly important because it should be useful for supporting my claim that, Croatian, while lacking 'at', has lexicalised the component 'coincidence' within the preposition 'na' (on), which, upon closer examination, turns out to be much more 'precise' (in the 'coincidental' sense) than 'u' (in), i.e. the second most frequent translation of the English 'at'.

With the latter observation in mind (but recalling also point c) above, i.e. the *'at Easter'* example), I would like to conclude this discussion of the EHR's entry under 'at' by suggesting that it is absolutely wrong to *start* the representation of the semantics of the English 'at' by offering as its first meaning an instance of functional coincidence ('at school'), that, furthermore, has as its translational equivalent the Croatian 'u' ('in'). This fact becomes even more problematic if we think about the fact that we also have the possibility of the English 'in school', translated into Croatian by 'u' ('in') as well. Now, if we recall that the most frequent (and 'precise') translation of 'at' into Croatian is 'na' ('on' — cf. point f above) we might want to state that the first entry listed as the lexicographic representation of the English 'at' in an English-Croatian dictionary, should be an instance of usage of 'at' which is rendered in Croatian by 'na' ('on').

Let us finally link the cognitive elements identified as representing the semantic core of the English preposition 'at' into the framework offered above for dealing with 'on' and 'in', and try to suggest a possible lexicographic portrayal of the English 'at', that would hopefully be more accurate and useful than the existing one.

at [æt] *prep.* Central meaning: locate (a point-like) X with respect to (a point-like) Y, as to make X and Y coincide. This coincidence is realised in four main categories: **1.** (spatial, locational coincidence — Cro. usually 'na'; 'u' only with toponimes that take 'u' in Croatian) *at the door, at the crossroads, at a proper place, at page 7, at the edge* (Cro. 'na' — on); *at Naples* ('u') **2.** (directional coincidence — lit. and fig. — Cro. 'na', 'u') *, aim at a mark, arrive at a place, throw sth. at smb., look at me, mad at you* ('na'); **3**. (functional coincidence — 'na', 'u', 'pri', 'za'*) at work, at the beach, at Oxford, at Easter* (Cro. 'na'); *at the Ritz / restaurant / hotel / office* ('u'); *at hand* ('pri'); at the desk ('za') **4.** (temporal — repeat the whole 'temporal scale' as illustrated for 'on').

5. [phrases] — 5–10 most frequent English 'at' idioms (as with 'on' and 'in', try and motivate the usages / group them in terms of underlying physical schema).

Conclusion – Toward A Better Dictionary

The concrete purpose of this paper has been to point to the major problems relative to the representation of 'on', 'in' and 'at' in an English-Croatian dictionary, and try to look for possible ways for solving these problems. In order to accomplish this latter task, we ventured into a general discussion of prepositional semantics, and concluded that prepositions are full lexical items, the core meaning of which is, at least from the perspective of what we know today, probably most fruitfully defined within a framework of cognitive semantics[13].

My belief is that the treatment proposed here could be useful for understanding and describing prepositional semantics in general. In section 2 we have, indeed, concluded that prepositions as a word class lexicalise a meaning that could be defined as a type of a gestalt-kinetic functional relation[14] expressed in terms of some schematic elements (e.g. points, axes, vectors, circles …). Having exemplified on three concrete prepositions how this could be done (for lexicographic purposes), my hope is to have shown that understanding and systematically describing prepositional semantics is a feasible, and, more importantly, useful[15] task.

What is particularly worth noting in the end is that the method proposed here for analysing i.e. describing prepositions has been construed at a cross-linguistic level; as such it should be valid for the analysis of prepositional systems in all natural languages (that employ prepositions)[16] and should

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[13]In this framework, we look for 'primitive senses' that are found in our most primitive experience: that of bodily beings who live and develop in interaction with an environment that is perceived via different senses and processed by the same neural system which processes language. Wouldn't it then be logical to assume that there are some 'meaningful experiences' which form not just the basis for (the processing) of various types of sensorial input, but also the semantic basis of at least a part of the human language faculty?

[14]It might be useful to make a distinction between *preposition of location* (static contexts) — the semantic core of which could be described as 'control of location' + 'schematic functional configuration', and *prepositions of motion* (motional contexts), described as 'control of (direction) of motion + vectorial functional configuration.

[15]Let us not forget that understanding prepositions correctly (in terms of their semantic core) enables learners to make very good guesses (construe reference objects) even if prepositions are used to put into relation items expressed by vocabulary items unfamiliar to the learner.

[16]The sort of relation that is in e.g. English and Croatian expressed by means of prepositions is in other languages expressed by spatial nominals (used in, e.g., Japanese and Korean), and case endings (used, e.g., in Finnish). It might be interesting to compare and contrast the total semantic load carried by these different lexical elements in all these languages.

readily lend itself for an analysis of any source – target language prepositional pair. As such it is seen as a universally valid tool for lexicographers 'struggling' with prepositions, be it in monolingual or in bilingual dictionaries. After all, Lindstromberg has recently stated his belief that 'there are bound to be ways of explaining prepositional usage' (2001: 99–100). This paper is an attempt aimed at trying to do exactly that.

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