# The Encoding of Static Spatial Relations in Croatian and in English

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**Abstract**

This thesis will present empirical evidence on the spatial meanings of the Croatian prepositions *'na'* and *'u'* and compare them to their English equivalents, as well as relate the findings to the existing body of research.

A total of 32 items was chosen chosen from the BowPed picture series in order to analyse spatial expressions (predominantly prepositions) used to encode various types of static topological relations. The participants who took part in the study (31 NSs of Croatian) were asked to locate the objects shown in the pictures both in Croatian and in English. Their answers were mostly obtained via Zoom video calls, as the primary focus of the study was natural, spoken interaction. The descriptions of the items provided by the participants are discussed in the context of the 'on-in continuum' designed by Bowerman and Pederson. The results seem to point to different cut-off points (i.e. boundaries) between categories of spatial relations in Croatian when compared to the English mode of spatial conceptualisation. Additionally, it has been found that two of the categories might be reversed in the minds of Croatian speakers. The most significant differences are observed with regard to the following categories: TRs impaled/spitted on LMs, encirclement with contact (a potential reversal of the categories), gaps or objects embedded in physical objects and relations of partial inclusion (closer to *'na'* in Croatian and *'in'* in English). Moreover, a part of the analysis is dedicated to verbs that sometimes occurred in the descriptions. This particular section of the thesis also explores the repetitive pattern typically found in some Slavic languages consisting of a prefixed verb followed by a preposition which is a cognate of the prefix. It was found that these repetitive structures (as well as verbs in general) were predominantly used when the participants felt the need to further specify a relation, or when they interpreted the picture as dynamic.

Finally, the study was aimed at establishing whether L2 proficiency plays an important role in the lexicalisation of static spatial relations in English. The participants were divided into two groups based on their level of proficiency (independent (A2-B1) and proficient (C1-C2) speakers). After comparing their English descriptions of the selected items, it was concluded that 1) speakers in both groups showed a tendency to 'switch' to more native-like descriptions (the saliency of support decreased, whereas the saliency of containment increased in the English descriptions), and 2) that the more proficient group consistently showed higher awareness of the differences between Croatian and English modes of spatial conceptualisation. Due to the small number of participants, the results could not be discussed in terms of statistical significance, but they do seem to suggest that proficiency has at least some influence on the encoding of static spatial relations in L2.

**Key words:** spatial prepositions, locative expressions, prepositional semantics, spatial conceptualisation, topological relations, BowPed picture series

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## 1. Introduction

Space is a highly salient domain of human experience and activity, and this is heavily reflected in language: the existence, location, disappearance and reoccurrence of objects are some of the fundamental experiences that children seek to encode in language at a very early age. In fact, most of children's earliest utterances revolve around a constrained, but universal set of meanings in which space and movement seem to play a crucial role (Bowerman, 1973; Brown, 1973; Slobin, 1970, 1973 in Bowerman & Choi, 2001, p. 476).

The term 'spatial language' refers to various ways in which we describe (encode) spatial descriptions of objects, as well as their relations to one another. Speakers of different languages use numerous coding strategies (which are closely related to various cognitive processes) in order to talk about space. For instance, we always choose the element(s) we wish to 'foreground' (define their position) in reference to other elements that are backgrounded (Thomsen & Heegård, 2018). How we choose to talk about the space that surrounds us is, of course, deeply rooted in our physical experience. We observe and manipulate objects and move our bodies through space. Moreover, we rely on our bodily experiences in order to appropriately *interpret* spatial language as well. The meaning of spatial terms is constructed on a conceptual (as opposed to purely linguistic) level and it therefore cannot depend solely on other lexical items present in an utterance (Tyler & Evans, 2003, pp. 8-15).

It might seem that our shared bodily experience (such upright posture and the force of gravity) should inherently imply universality when it comes to spatial language, or at least, spatial concepts. However, languages differ significantly in how they encode these concepts, which makes it difficult to establish how 'universal' space actually is. For example, in English, children start using words such as *'up', 'down', 'in'* and *'out'* very early in the process of L1 acquisition. As we can see, these are all one-word utterances, whose meaning is quite

straightforward, yet we do not always find their translation equivalents in other languages. The issue grows even more complex once we take into account that the absence of a specific (linguistic) term does not necessarily imply the absence of an equivalent c*oncept.* Furthermore, there is noteworthy cross-linguistic variation in terms of elements that are used to estimate whether something 'counts' as an example of a specific spatial relation (e.g. support or inclusion). Finally, we observe different 'cut-off points' between spatial categories in different languages (Bowerman & Choi, 2001, pp. 479-480).

All things considered, it should come as no surprise that spatial language is often explored in the context of the famous Sapir-Whorf hypothesis on linguistic relativity. For centuries, linguists have been trying to unravel whether the language we speak influences the way we think, or conceptualise, about the world. In other words, are the abovementioned differences in linguistic spatial categories a reflection of differences in spatial conceptualisation (a consequence), or do they, once acquired, determine how we will conceptualise space? The human mind is, of course, far too complex to offer a simple answer to this question. Some have even suggested that these differences only become relevant once we actually need to communicate meanings, or once we use 'thinking for speaking' (Slobin, 1973).

Nonetheless, there have been numerous attempts to systemise categories of spatial relations expressed in a language. When it comes to Croatian specifically, despite extensive and insightful works on the semantics of Croatian prepositions (Šarić, 2008; Matovac, 2013) and their comparison to spatial terms in other languages (Brala, 2000 in Brala-Vukanović, 2013), there is still a lack of empirical-based studies. This thesis therefore hopes to bridge this gap by offering insights into the usage of Croatian locative expressions in natural, spoken interaction. The thesis will first outline the theoretical framework that is used as the basis for the analysis of the obtained data. This section will offer an explanation of some of the basic terms related to spatial conceptualisation that are frequently used in Cognitive linguistics. We

will then turn to the semantics of spatial prepositions specifically, and provide a detailed overview of the meanings of two Croatian prepositions: *'na'* and *'u',* which will also be compared to their English equivalents. The thesis will then present the findings of previous cross-linguistic research on spatial language, and touch upon some difficulties that learners often experience when acquiring spatial terms in L2. We will then extend the analysis to other linguistic elements that convey spatial meaning, and relate these elements to the ideas of Distributed spatial semantics. In these sections, special attention will be given to verb-preposition collocations ('motion along a path'), and we will introduce a particular repetitive collocation pattern found in some Slavic languages. The seventh section of the thesis is dedicated to the present study (its aims, research questions, hypotheses, participants, methodology and results). The results of the study will then be discussed in detail, and we will try to establish how NSs of Croatian encode different spatial relations both in their native language and in English. The results will be related to Bowerman and Pederson's 'on-in continuum' of spatial relations, and we will try to determine whether proficiency levels have an effect on the lexicalisation of spatial relations in English. Finally, we will try to present some conclusions and offer suggestions for further research.

## 2. Basic concepts relating to spatial conceptualisation and the encoding of spatial relations

Before delving into the analysis that will be presented in this thesis, it is important to define some key concepts that are frequently used in the field of spatial semantics, especially in the context of the Cognitivist approach. We must first unravel all elements typically present in static spatial scenes, and explain how we conceptualise space, acquire spatial terms, and finally, encode spatial relations in language.

According to Cognitive linguistics, language does not directly reflect objects present in the real world, but rather conceptual structures in the mind of its speakers. However, we must be careful when interpreting this commonly accepted viewpoint. Semantic structures are not perfectly identical to conceptual structures – we cannot speak of one-to-one correspondence between a concept and a linguistic expression. According to Greene (in Brala-Vukanović, 2013, p. 118): *'while all linguistic meanings are conceptual structures, not all conceptual structures are linguistic meanings.'* Moreover, as Talmy (2000) points out: *"A combination of semantic elements can be expressed by a single surface element, or a single semantic element by a combination of surface elements."* (p. 21). Simply put, there is not always a specific linguistic/lexical item attributed to a single concept present in the mind.

Cognitive linguists agree that meaning is, at least in part, constructed based on the human bodily experience. Our senses allow us to differentiate *'up'* from *'down'* or *'front'* from *'back'.* Our physical interaction with the world is not reflected only in how we talk about the physical aspect of the world that surrounds us, but is also often represented in metaphorical language (e.g. *'feeling up'* or *'down'*). This is not to say that how we construct and encode meaning is only rooted in our physical experience, which is then attributed to concepts and encoded in language. Rather, we speak of a dynamic, interactional process between language

and thought. In other words, the relationship between language and thought is bidirectional – conceptualisation influences language, but also vice versa (Brala-Vukanović, 2013, pp. 117-123).

The mapping between the elements in the real world and linguistic expressions is not as direct as was once thought, as there are many different ways in which one and the same concept, or situation, can be expressed through language. In cognitive semantics, the way in which speakers choose to structure and encode phenomena in language is known as 'construal'. Construal is dependent on various cognitive processes, such as focal adjustment, perception and foregrounding.

The notion of focal adjustment is crucial to understanding how we communicate meanings. It refers to the way in which we focus our attention on particular aspects of a scene that we wish to describe. It governs the linguistic organisation, i.e. our verbal description of that scene (the choice of linguistic items and/or grammatical constructions), thereby imposing a particular construal upon that scene (Brala-Vukanović, 2013, p. 126; Evans, 2007, pp. 81-82). The construal that is imposed is closely related to perception. Our point of view determines which of the elements in a scene will be chosen as the Ground (the reference point) and which as the Figure (that moves with respect to the Ground). Figures are typically smaller and more movable, whereas objects chosen as the Grounds are larger and more fixed (Brala-Vukanović, 2013, pp. 126-127). This is why, when describing spatial relations, we typically focalize the Figure. *'A car is in front of the house'* sounds more natural than *'the house is behind the car',* because the position of the car (given that it is smaller and more movable of the two objects) is more likely to change than that of the house. The Figures are therefore primary focal elements (also referred to as 'Trajectors'), whereas Grounds are secondary focal elements (also known as Landmarks) (Langacker, 2010) and, as can be observed from the examples, the relation between the two is typically expressed with a preposition. In linguistic terms, we typically

express spatial relations with the following pattern: NP1 (the Figure/Trajector) + prep. + NP2 (the Ground/Landmark). The Figure-Ground selection is not governed solely by the physical characteristics of the objects, but also by pragmatic factors and element saliency. More salient elements are more 'pronounced', i.e. viewed as more important by the observer, which is, in turn, reflected in how they lexicalise the scene. The most salient elements are 'foregrounded' (given more attention), while others are 'backgrounded' (less focalized and given less attention) (Brala-Vukanović, 2013, pp. 127-128). Additionally, speakers take into account the functional element of the relation between the Figure and the Ground. Since this functional aspect often has palpable effects in the real world, people are exposed to its effect in their day-to-day lives. For this reason, it is one of the crucial factors in determining how to encode a spatial scene in language. According to Langacker (2010), Vandeloise frequently emphasized the importance of function in spatial relations, arguing that it is at least as equally important as other spatial properties of a relation. For example, the function of containment is equally important for the meaning of *'in'* as is spatial inclusion; the function of support is essential for the meaning of *'on'*, etc.

In order to encode a spatial relation with a specific preposition, speakers always need to somehow frame the scene, i.e. choose larger reference points. In other words, speakers use a coordinate system and axial properties to determine the direction and relative proximity of an object in relation to the reference object (Evans, 2007, p. 179), and then adjust their linguistic description accordingly. This explains why the same spatial scene can be described with various (and, sometimes, seemingly contradictory) prepositions (Matovac, 2013, p. 77). This is known as 'the frame of reference', which can be intrinsic, relative or absolute. When an object is located in reference to another object, we speak of intrinsic frame, whereas the term 'absolute' is applied when we use fixed (spatial) references to locate an object (e.g. cardinal

directions). Relative frame of reference is a system in which an object is located both in reference to another object, as well as the speakers' viewpoint (Levinson et al., 2003, p. 32).

Before taking a closer look into prepositions specifically, it is crucial to define image schemas, as they are largely constructed based on our everyday bodily experience of and interaction with the world that surrounds us. They are conceptual representations, or structures, which reoccur within our cognitive processes. As the name itself suggests, schemas are not detailed concepts, but abstractions. These patterns repeatedly emerge and are gradually 'built' in conjunction with our physical, cognitive and linguistic development (Brala-Vukanović, 2013, pp. 124-131). Some common examples include 'up-down', 'centre-periphery' etc., and the meanings of prepositions are often explained precisely through pre-existing image schemas in the mind of the speakers.

## 3. Prepositional semantics

Prepositions are typically defined as functional (as opposed to lexical) words used to express the relations between lexical words (mostly nouns and pronouns), such as time, place, location, etc. It is not surprising that this is precisely why they are often researched in the studies on spatial language, even though languages use a whole variety of linguistic means to encode space, such as affixes and cases. Albeit being fairly small lexical units, their meaning has been notoriously difficult to define (mainly due to their polysemy), and their usage is often idiomatic (Taylor, 1995 in Matovac, 2013, p.43). We cannot always predict the occurrence of a preposition in a language, and it seems that the more abstract the meaning, the more difficult it is to draw conclusions. In fact, the problem of prepositional semantics was even viewed as too demanding to describe systematically. According to the traditional approach, there are several different meanings attributed to a single preposition in a speaker's mental lexicon,

which are arbitrary and essentially unrelated to one another. This hypothesis has since been disproven, as it would imply that different meanings of lexical units are stored separately in the mind, with no systematic links between units (Brugman and Lakoff, 2006; Lakoff, 1987; Langacker, 1987; Langacker, 2008; Tyler and Evans, 2003; Evans, 2005 in ibid., p. 44). If this were true, communication would inevitably fail. It would mean that speakers of a language are free to arbitrarily attach completely new meanings to existing lexical units, and that there are no semantic features that drive them to choose one lexical unit over another. The formalist and the structuralist approach (with Viggo Brøndal as one of its main representatives) would then argue that some prepositions are devoid of true meaning, and viewed simply as relation markers between lexical words (Bortone, 2010 in ibid., pp. 45-46). This assumption fails to explain how a change of a preposition can render a completely different meaning of a phrase. Consider, for example, the difference in meaning between: *'I came to Paris'* and *'I came from Paris.'*. Such issues yielded the division of prepositions into lexical and grammatical. Some linguists view this distinction as a continuum, given that a preposition can have different meanings, depending on the context (Kurzon, 2002; Bordet and Janet, 2010, in ibid., pp. 48-50). Finally, with the rise of the Cognitivist approach, prepositions were understood as polysemous lexical units, whose grammatical role is semantically different, and their meanings formulate a semantic network via systematic relationships (ibid., p. 51). The first extensive elaboration of these relationships is provided by Lakoff (1987). Building on the works of Lindner (1981) and Brugman (1981), he uses the example of *'over'* in order to illustrate how all various meanings of a preposition can be linked to one core image schema, i.e. its 'central sense'. The underlying image schema of *'over'* combines elements of *'above'* and *'across'*. Since *'over'* can, but does not necessarily imply contact between the Trajector and the Landmark, its central image schema is neutral in terms of contact and can therefore not be drawn correctly – it is an abstraction. Due to its neutrality, it simply serves as the basis, or the starting point, for building

all other mental images associated with *'over'* (this is precisely what makes it schematic). Other specifications (e.g. the boundaries of the LM) are then filled in by either matching or adding various elements that we find in the context (both external and in terms of co-text specifically) to the core schema. This means that a) all schemas are connected to the core schema on various points, based on what they have in common, and b) not all of these links are identical, i.e. built on the same features. We can differentiate among instance links (a scene is an instance of a schema), similarity links (subschemas share some properties) and transformational links (subschema is somehow related to another subschema – the properties that they link are therefore not shared (identical), but related to one another). Metaphorical language serves as further proof that the polysemous nature of prepositions is never purely arbitrary. If we were to use an expression such as *'get over'* (e.g. *Harry still hasn't gotten over his divorce.'*), we would perceive the obstacle that someone needs to overcome as a vertical Landmark standing in one's way. This obstacle (the divorce) is understood as occurring on Harry's (Trajector's) (life) path. We are essentially implying that Harry still has not moved *above and across* the divorce and left it behind him. As we can see, the use of this metaphor is *motivated* by the underlying image schema associated with the spatial meaning of *'over'.* In summary, all image subschemas that we gradually build in relation to the meaning of a specific preposition are always connected to and motivated by other subschemas (p. 418-461).

There have been numerous attempts to define the prototypical (or primary) meanings of prepositions. According to Tyler and Evans (2003) (in Matovac, 2013, p. 65), prepositional meaning can be considered prototypical if it meets the following criteria; 1) earliest confirmed meaning; 2) dominance in the semantic network; 3) its usage in compound forms; 4) relation to other prepositions; 5) grammatical predictability. Speakers' intuition and introspection are typically added to this list of criteria. When all these elements are taken into account, the spatial meanings of prepositions are usually considered their prototypical meanings. Furthermore,

Vandeloise (2006), as stated in Matovac (2013, p. 69) proves that spatial meanings of prepositions are the first to be acquired in L1, as well as in L2.

We must keep in mind, however, that it remains difficult to establish a 'central member' of a category when it comes to prepositions, as there is not always a direct reference to their meanings in the real world. 'Encountering' spatial relations is quite different than encountering animals or objects. We do not speak of 'best representatives' in the traditional sense, but their *realisations,* i.e. abstract ideas which are then realised through spatial relations (or of key features attributed to examples of a category) (Taylor, 1995; Šarić, 2001; 2008; Evans and Greene, 2006 in Matovac, 2013, p. 66). More specifically, Šarić (2008, p. 36) argues that the category of prepositions is shaped according to an idealized abstract geometrical relation, which can be viewed as a prototype.

Is there a way to simplify these issues, and, consequentially, simplify the analysis of the meaning of spatial prepositions in crosslinguistic research? Brala-Vukanović (2013, p. 190) combines Langacker's and Vandaloise's emphasis of the functional component in a spatial relation and Šarić's (2008) observations on their abstract geometrical features, stating that *'the semantics of prepositions is probably best interpreted as a combination of control and schematization'.* This means that, firstly, prepositions do not express links between objects themselves, but rather their geometric descriptions, views or abstractions of objects (schematization). The author clarifies these particular types of links established by prepositions by contrasting *'frog is in the grass'* with *'frog is on the grass'.* If we were to say that a frog is *in* the grass, we would not only impose a particular construal in terms of the spatial relation, but also of the properties of the grass – in this case, it is probably higher and partially obstructs our view of the frog, as it, in a way, 'encloses' or 'contains' the frog. *The frog is on the* grass, however, means that the grass 'supporting' the frog is probably shorter and we can see the majority of the frog's body. A similar example is given in Šarić (2008, p. 111) to illustrate how

speakers encode much more than just the location of the objects when they encode a spatial relation. The author analyses the differences in imposed construals between *'He is lying on the bed'* and *'He is lying in the bed.'*. The first sentence implies that we can see the man's body and he is lying on top of the covers. In the second example, the person is probably covered with blankets and his body is not entirely visible to the speaker. Moreover, a different choice of a preposition can be governed by pragmatic factors – if a person is *in the bed,* we might wish to express that the person is ill or sleeping, whereas there are no such implications related to a person being *on the bed.* Finally, *functions,* such as containment and support mentioned earlier play an important role, as they specify how an object (the Landmark) *controls* the location of another object (the Trajector), which determines our choice of the most appropriate preposition (Brala-Vukanović, 2013, p. 190).

### 3.1.Croatian prepositions *'na'* and *'u'* and their English equivalents

Since this thesis predominantly deals with Croatian static spatial relations encoded with *'na'* and *'u'* (as most of the elicitation materials are focused on such relations) and their English equivalents, the meaning of these two prepositions will be described in this chapter. Other relevant spatial relations and the corresponding Croatian prepositions (such as *'oko'* and *'preko'*) will be analysed in the discussion.

#### 3.1.2. Preposition *'na'* and its English equivalents

*'Hrvatski jezični portal'* (hereafter – HJP), an online Croatian dictionary, defines *'na'* as follows: 1) signifies a place on which something is placed or where something ends up (*'to put the book on the table'*); 2) signifies a place (typically a surface) where something is located (*the book is on the table'*). As we can see, these definitions do not tell us much about the

meaning of the preposition itself, but actually define the Landmark. They do, however, point to a difference in meaning in dynamic (1) and static (2) spatial relations. According to Šarić (2008, pp. 37-42), *'na'* is one of the 'primary prepositions' originating from Proto-Slavic, and it can be found in all Slavic languages. In her work, the author analyses prepositions based on Taylor's (1993) distinction between four types of spatial relations encoded with prepositions: goal, place, path and source. The spatial meaning of *'na'* first and foremost corresponds to the function of support and relation of coincidence (both spatial or temporal), i.e. co-occurrence in space or time. More precisely, it expresses either space and contiguity (between two objects) or contiguity and coincidence, in which case the Landmark is a surface, a line or a point. If we analyse its usage in more detail, we could say that, in terms of Taylor's categories listed above, *'na'* falls under the categories of place or goal. When it refers to a place, it is followed by a noun in the locative case and it is used mainly in contexts in which it describes a static spatial relation (e.g. *'Čaša je na stolu' – 'The glass is on the table'*). In dynamic contexts, it signifies the goal of an action, and combines with the accusative case (e.g. *'Objesio je sliku na zid' – 'He hung the picture on the wall'*). The author places an emphasis on how different prepositions combine with cases in Croatian, arguing that a comprehensive analysis of Slavic prepositions is virtually impossible if we do not pay attention to cases. This approach seems to be the most sensible, as prepositions (given their relational nature) are never looked at in isolation, but discussed on the morpho-syntactic level, i.e. in terms of prepositional phrases. Their meaning is therefore best elaborated through (and inseparable from) the meaning of the noun phrase that follows, which is determined by its case. The preposition, the noun and its deflection formulate a functional compound in the Croatian language (Svaćko, 1993).

Let us first discuss different types of static spatial relations encoded with *'na'* followed by a noun in the locative case. We could argue that the (proto)typical meaning of *'na'* implies contact of the TR with the horizontal, upper (usually, but not necessarily, upward-facing)

surface of the LM. The functional component of its (proto)typical meaning usually refers to the fact that the LM prevents the TR from falling to the ground. However, it is crucial to understand that contact, the function of support, as well as control of location can all be present to a lesser or a greater extent. For example, contact can either be partial or complete, direct or indirect, etc. Control of location varies depending on the exact location of the TR, the point of contact with the LM, the shape and position of the LM and so on. If the TR is closer to the edge of the LM, for instance, the control of location diminishes. The same applies if the scene is rotated – vertical relations demonstrate a lesser degree of control when compared to horizontal relations. Compare, for example *'zdjela je na stolu'* (*'the bowl is on the table'*) with *'slika je na zidu'* (*'the picture is on the wall'*). It is clear that the wall has much less control of the location of the picture. In fact, the picture is hung on a hook, and not directly controlled (or supported) by the wall itself. Its surface, however, is in contact with the surface of the wall, which is in line with the typical *'na'* image schema. In some cases, this contact also imposes a construal of an LM being *inside* the TR (*'na sebi nosi haljinu' – 'she is wearing a dress* (lit. *on herself*); '*ima prsten na ruci' – 'he has a ring on his finger'*).

Similarly, *'na'* is frequently used in what Šarić names *'part-of relation',* which is mainly related to notions of joining and attachment. The possibility of separation of the LM and the TR can be limited, and the relation may only *resemble* support, which is often indirect. The TR can therefore be an inherent part of the LM, but still encoded with the preposition *'na'*. Some examples include *'motivi na tepihu'* (*'motifs on a carpet'*) or *'mrlja na majici'* (*'stain on a T-shirt'*). Motifs and stains cannot be supported by nor in contact with (in a literal sense) the surface of their LMs, mostly due to the fact that they are not three-dimensional objects. Furthermore, one cannot simply physically remove or separate them from the LMs. These spatial scenes can be both vertical and horizontal (*'prozori na zgradi' – 'windows on a building'*). Other similar examples include relations such as *'kvaka na vratima' – 'knob on the*

*door'*, which demonstrates a slightly higher degree of support when compared to the examples discussed previously. *'Privjesak na ogrlici' – 'pendant on a necklace'*, on the other hand (which can also be seen as a part of the necklace), resembles a hanging relation, thereby implying a slightly higher possibility of separation, but not direct support.

This is not to say that contact with the surface is the defining element of relations encoded with *'na'*, as contact can be established only at a specific point. An entire group of spatial relations that exemplifies this specific type of contact is that of 'hanging TRs', such as *'kaput na vješalici'* (*'coat on a hanger'*). Furthermore, some examples denote a 'superposition' in which there is no contact at all between the surface of the TR and that of the LM – *'mostovi na rijeci Cetini' – 'the bridges on the Cetina river'*. As we can see, the bridges do not physically touch the surface of the water, and are therefore not supported by the river in any way. I would argue, however, that examples denoting superposition are relatively rare.

Another subgroup of static spatial relations that could be categorized as *'part of relations'* refers to locations in outer open areas and buildings (such as squares or platforms). These relations can, in addition to contact between the surfaces and support from below, imply the notion of containment (*'radnici na polju' – 'workers in the field'; 'žene na trgu' – 'the women in the square'; 'soba na drugom katu' – 'the room on the second floor'*). The LMs (field, square and the second floor) can be seen both as flat surfaces supporting the TRs and as containers or enclosed areas because all of them are conceptualised as having physical borders.

Another common usage of the preposition *'na'* refers to the contexts in which the speaker locates the Trajector on 'idealized Landmarks' - imaginary lines, edges or pathways, which are not visible to the observer in their entirety. Consider, for example, utterances such as *'brodovi na liniji između jadrana i karipskih luka'* (*'the ships on the* line *between the Adriatic and the Caribbean harbours'*), *'jezero na granici'* (*'the lake on the border'*) and

*'crpka na autoputu' – 'the gas station on the freeway'*). In these examples, *'na'* signifies an LM which is contiguous with the TR, and perceived as a line (ibid., pp. 42-47). In the first example, the LM is actually an entire route, and the TR is located between its two end points. This might be related to the way in which we often transfer larger areas, such as routes, countries and continents, into visual form – we create maps and essentially draw physically smaller locations *on* (or even *as*) specific points of the map. These diagrammatic representations help us visualize larger areas and understand spatial relations that are impossible to observe with the naked eye, so it is no wonder that this is how we express such relations in spoken language. Note that in English, similar spatial scenes are often encoded with *'at'*. In fact, Lindstromberg (2010, pp. 173-176) states that *'at'* typically involves a mental activity of *'zooming out'*, which results in the TR and the LM being viewed from such a 'distance' (i.e. in the context of a much larger area) that they *'merge into a single point'*. The 'faraway perspective' discussed above is why it is used to express 'points on a route', such as stop, end or turning points (e.g. *'We got off the ship at all ports'; 'Make a right turn at the first light'; 'I stopped at page 7.'*). An entire group of spatial relations encoded with *'at'* pertains specifically to larger geographical areas (what the author calls *'location in broad scope views'*). In these cases, the speaker perceives the scene as if they were observing it from a higher point, resulting in utterances such as: *'(...) the Mississippi is at last joined at St. Louis by (...) the mighty Missouri.'* Note that there is no Croatian equivalent to *'at'*. Speakers of Croatian use either *'na'* (*'on'*) or *'u'* (*'in'*) to encode such relations, depending on other properties of the spatial scene, the function of the LM, and physical and geometrical properties of the objects in relation. For example, the first sentence would be translated as *'Sišli smo s broda u svim lukama.'* (lit. *'**in** all ports'*) because the speakers of Croatian conceptualise ports as (partially) enclosed areas, whereas they would say *'Stao sam na 7. stranici* (lit. *'**on** page* 7) because pages are seen as surfaces with writings on them (or as integral parts of the pages themselves).

We can conclude that even the meaning of *'na'* in static spatial scenes is far from simple. The notions of contact with (outer) surface, the function of support and control of location all seem to play an important role, but not all of them need to be present simultaneously or to the same degree.

When we look at the meaning of *'na'* followed by the accusative case, the analysis is slightly more straightforward (that is, if we stick to the general notions encoded in motion events and if we exclude temporal and metaphorical meanings, which exceed the scope of this research). *'Na'* in combination with the accusative case signifies (or introduces) the *goal* of an action:

a) 'Naslonio se na klavir.' ('He leaned onto the piano')
b) 'Odložila je kutiju na pod.' ('She put the box down on the floor.')
c) 'Napisao je nešto na ploču.' ('He wrote something on the blackboard.')
d) 'Stao je na kukca.' ('He stepped on a bug.')

Sentences a), b) and c) all illustrate a deliberate action directed at the LM, whereas the action in d) can also be interpreted as accidental (The person accidentally stepped on a bug). What all of these sentences have in common, however, is the end result – one of the previously discussed spatial relations between the TR and the LM, which from the syntactic viewpoint functions as a direct object.

The meaning of *'na'* (especially its prototypical spatial meaning) most closely resembles that of the English preposition *'on'*. Merriam-Webster (online) Dictionary offers an extensive overview of various definitions of *'on'* (both literal and metaphorical), taking into account various types of relations that it helps establish. The first definition (which is presumably the most frequent and also the most prototypical) is as follows:

1 a) used as a function word to indicate position in contact with and supported by the top surface of (‘the book is lying *on* the table’)

b) used as a function word to indicate position in or in contact with an outer surface (‘the fly landed *on* the ceiling’)

c) used as a function word to indicate position in close proximity with (‘a village *on* the sea’)

d) used as a function word to indicate the location of something (‘*on* the south side of the house’)

The entry also includes relations of attachment and support (‘*on* a string’). Similarly, Lindstromberg (2010, pp. 51-53) firstly points out that *‘on’* is used to talk about relations in which the TR is in contact with the LM, which is a supporting surface. Such a relation can also be the *result* of a previous action, i.e. movement (*‘He put the book on the table’*). As we have seen, the result of a prior movement is lexicalised with the accusative case in Croatian. The author then proceeds to explain that the same principles apply when the scene is rotated (*‘bug on the ceiling’; ‘mirror on the wall’*). Furthermore, the contact between the TR and the LM does not need to be complete. Attachment can also be established only at specific points, as opposed to surfaces (*‘I feel like a balloon on the end of a string.’*; *‘catch your skirt on a nail’*). In these spatial scenes, the LMs are typically hooks, nails, splinters and other objects that are ‘sticking out’ from a larger surface.

In some cases, the TR is also a part of the LM (e.g. *‘Only a rattlesnake has a rattle on the end of its tail.’*). Lindstromberg, unlike Šarić, does not categorize such relations as a separate group, but we could argue that the underlying image schema is virtually identical. Like in some of the Croatian examples included in the analysis, there are spatial relations encoded with *‘on’* that do not necessarily imply support, such as *‘Both of these campgrounds are right*

*on the ocean.'* or *'(...) station on the motorway.'* We could also argue that the semantic feature of 'contact' is questionable – both of the TRs are separated from the LMs by, at least, a strip of beach or another part of the road. I believe that these examples could also be explained with the tendency of speakers to 'zoom out' on larger areas so that the TR and the LM merge into a single point (recall that this is a mental operation that Lindstromberg primarily associates with the meaning of *'at'*).

Finally, the author mentions an additional category related to *'on'* that we do not observe in the Croatian language. This category refers to movement and orientation, rather than physical properties of objects, and the meaning of *'on'* in these contexts could best be described as the opposite of *'back'* (e.g. *'Come on (back a bit)'*). We can see that, in these examples, *'on'* primarily means *'in the direction being faced and/or in the same direction as before'* (ibid., pp. 53-54). The Croatian language would require the usage of a demonstrative pronoun or an adverb instead of a preposition to express such meanings (e.g. *'Vrati se malo unatrag'* (the equivalent of the example given by Linstromberg) or *'Dođi ovdje' – 'Come here'*).

We have already mentioned the usage of *'on'* in relation to movement, i.e. in dynamic contexts, in Croatian (*'na'* + acc.). However, we have yet to discuss whether *'on'* would be the most appropriate translation of these Croatian structures across all contexts. If we look back at the example sentences a) – d), it becomes clear that *'na'* + acc. sometimes more closely corresponds to *'onto'* (*'Naslonio se na klavir.' – He leaned onto the piano.'*). Lindstromberg (2010, pp. 54-55) defines *'onto'* as a transitive, dynamic counterpart of *'on'*, stating that the TR makes forceful contact with the (usually upper) surface of the LM. As was shown by this example, the Croatian language does not make this distinction by using a distinct, more 'emphatic' preposition. Instead, the preposition remains unchanged (*'na'*), whereas the 'forceful' nature of the contact (and manner in general) is encoded with a verb – either with the verb itself or with its prefix.

Based on everything discussed in the previous paragraphs, we can conclude that the meaning of *'na'* partially overlaps with the English preposition *'on', a*nd partly with *'at'*. Additionally, in more dynamic contexts it may correspond to *'onto'*, depending on properties such as the meaning of the verb (and therefore the type of contact that was established), its prefix, the manner of the action and so on.

### 3.1.3. Preposition *'u'* and its English equivalents

According to HJP, when used in its static, spatial sense, *'u'* expresses that *'something is located or exists within something, within its boundaries or range ('u gradu' – 'in the city')'*. Šarić (2008, pp. 83-85) equates its meaning with containment and enclosure, i.e. relates it to container image schemas. It can combine with locatives (static scenes) and accusatives (dynamic scenes). In an ideal, prototypical relation, it presumes full enclosure of the TR by the LM, which is a container-like object (e.g. *'kreda u kutiji' – 'chalk in the box'*). However, it allows for various degrees of enclosure, and in some cases, enclosure may not even be present. If we are looking at a bowl of fruit, we might lexicalise the scene with *'voće je u zdjeli'* (*'the fruit is in the bowl'*). Nonetheless, while all pieces of fruit are contained in the bowl, some of them might be placed on top of other pieces of fruit, and even protrude from the bowl. Therefore, not all pieces of fruit are enclosed by the bowl, but the tendency is still to describe their position with *'u' a*nd choose the entire bowl as the LM. Another similar example provided by the author is *'cvjetovi u vazi'* (*'flowers in the vase'*), in which only a part of the TR is actually within the boundaries of the LM. One of the container's boundaries might not be clearly defined, as in: *'vlak u tunelu' – 'train in the* tunnel'. The boundaries of the LM might

even be only *imaginary* or perceived, hence they do not need to be evident in the speakers' physical surroundings (*'stolica u kutu' – 'chair in the corner'*).

Everything we have discussed so far refers to three-dimensional objects that the observer interprets as containers of other objects. Yet, the meaning of *'u'* extends to two-dimensional objects as well, such as picture frames or doors (*'slika u zlatnom okviru' – 'the picture in the golden frame'; 'stajati u vratima'* – lit. *'to stand in the door'*). These LMs are apparently also perceived as containers with defined borders, despite the fact that they lack voluminosity. In addition, the observer can sometimes choose an abstract point in space as the LM, whose properties cannot be measured based on our physical experience. Consider, for example, the usage of *'u'* in: *'Pravci x i y sijeku se u točki Z.' – 'The lines x and y intersect at* (lit. ***in***) *the point Z.'* (Šarić, 2008 in Belaj, 2009, pp. 76-77). These imaginary or 'idealized' points resemble those pertaining to *'na'* in specific contexts, but it seems that they mostly apply to relations that exceed the domain of physical space.

The following subcategory of static spatial relations encoded with *'u'* consists of those spatial scenes in which the TR is covered by the LM from above (e.g. *'čokolada u papiru' – 'chocolate in the (paper) wrap'; 'karanfili u celofanu' – 'carnations in cellophane'*). The difference between these spatial relations and those that could be considered prototypical lies in the fact that in these examples, the LM is (re)movable, whereas the TR is seen as static. These somewhat unusual properties of the TR and the LM (their seemingly reversed features) can be attributed to the fact that the chosen TRs are still *contained,* even if only temporarily, within the LMs.

In addition to two and three-dimensional objects, various types of materials or matters can serve as the LM, whose borders are not observable or clearly defined (*'avion u zraku' – 'plane in the air'; 'riba u vodi' – 'fish in the water'*). Moving even further away from the

prototypical meaning of *'u',* we find examples in which the TR and the LM are not two separate entities (*'rupa u zemlji' – 'hole in the* ground'). Instead, the speaker chooses the TR based on some of its physical properties, which differentiate it from the (rest of the) LM. In fact, the TR and the LM may even be conceptualised as a single entity, as the TR essentially dissolves into or in some other way merges with the LM – *'šećer u kavi'* (*'sugar in the coffee'*).

Just like *'na'*, *'u'* can be used to describe 'part of relations' as well, as exemplified by *'ladica u stolu'* (*'drawer in the desk'*) or *'vrata u dnevnoj sobi'* – (*'the door in the living room'*). In these cases, the TR has been built into or as an integral part of the LM. Similarly, the Croatian language uses *'u'* when the observer is referring to substances as the TR, whereas the LM is the *form* in which this substance is present (*'mlijeko u prahu'* – lit. *'milk in powder'; 'kvasac u granulama'* – lit. *'yeast in granules'; šećer u kocki' – 'sugar in cubes'*). We could still argue that, to some extent, these TRs are *contained* within these specific forms of substance. A specific elaboration of this particular image schema consists of *groups of entities* viewed as a single TR, described in relation to a spatial occurrence (the LM), which is, in turn, inherently or contextually related to the TR (*'ljudi stoje u redovima' – 'people are standing in queues'*; *'lonci se prodaju u kompletima' – 'the pots are sold in sets'*) (Šarić, 2008 in Belaj, 2009, p. 77).

The underlying image schemas typically associated with its static meaning are quite similar to those we find in dynamic scenes. *'U'* is followed by accusatives to create directional meanings, in which the LM (a container-like object or concept) is the Goal of the action. We might say, for example *'Ušao je u sobu'* (*'He entered the room';* lit. *'He entered* ***in*** *the room.'*), in order to express that the person (who was presumably outside) now entered a container-like structure, which was the Goal of his action. The interpretation of *'u'* in these contexts is dependent on the meaning and the type of the verb that is used (e.g. a motion verb to express

directionality). Apart from expressing directionality and the Goal of one's action, these structures also bear implications about the *conceptualised shape* of the Goal (the LM).

There are subtle differences in meaning between various accusative constructions containing *'u'* (which are, again, dependent on some other aspects of the utterance, such as the semantics of the verb itself). To point out some of the possible variations, let us contrast *'Marko je otišao u kafić' – 'Marko went to the café'* with *'Marko je ušao u kafić.' – 'Marko entered the café.'* In the first sentence, the café represents the overall goal of Marko's action, whereas in the second example, the goal might not be as 'general'. In other words, the goal of the action is slightly more specific, as it refers to the inner part of the café. Additionally, the latter sentence implies that Marko was closer to the Goal of his action when compared to the first example.

Generally speaking, we could say that, in addition to the container image schema, *'u'* + acc. also involves Source-Path-Goal schema. Which of these elements will be highlighted, however, depends on other elements of the utterance. Regardless of the highlighted element(s), dynamic contexts with *'u'* imply a change of location of the TR, which, in idealized (prototypical) conditions moves along a path towards the interior of the LM. Particularly interesting contexts involve constructions in which the TR is an instrumental complement – either an inanimate object or a body part (of an animate or inanimate object). This allows us to state that *'Marko je lupio nogom u stol'* (*'Marko hit the table with his leg'*); *'Marko je lupio Ivana u nogu.'* (*'Marko hit Ivan in the leg.'*) and *'Marko se udario u nogu.'* (*'Marko hit himself in the leg.'*). These conceptualisations do not have a corresponding image schema related to the static spatial meaning of *'u'* + loc. (Šarić, 2008, pp. 97-99).

Lindstromberg (2010, p. 72) offers similar elaborations of the English preposition *'in'*, offering an image of a dot placed completely inside a rectangle as the most prototypical visual representation of its meaning (a container-like object with clearly defined borders (the LM)

that encloses the TR). While this representation may seem to overlap with the Croatian understanding of *'u',* this is not always the case. For NSs of English, this underlying image schema also corresponds to someone or something being *'in the picture'* – The picture is seen as a container-like object (albeit two-dimensional), with other elements being contained within its borders. In Croatian, however, objects are conceptualised as being *'na'* (*'on')* the picture, because Croatian speakers pay more attention to the fact that the LM is a flat surface. They therefore view this relation as one of support.

Despite some differences in what 'counts' as containment between Croatian and English, the two languages do seem to agree that the meanings of *'u'* and *'in'* are not exclusively limited to relations of full inclusion. How much of the TR is actually within the LM, and the (visible) presence of the LM's boundaries can vary (*'plant a tree in the ground'* vs *'sit in an armchair'* vs *'be in the water'* vs *'be in the bed'* vs *'be in a house'*). We can see that in these examples, we gradually move from more borderline to more prototypical meanings of *'in'.* In the first example, only the roots of the tree are actually in the ground; in the second example, the TR is partially enclosed, but not all of the LM's borders are present and so on. Lindstromberg also points out that the TR does not necessarily have to be physically inside the LM (recall the example of a bowl of fruit), accentuating that the control of the location (what he calls *functional containment*) plays an important role. Apart from the functional properties of the LM, the author also mentions 'gestalt completion', explaining that the observer is likely to conceptualise an object (such as a bowl) as a full circle (even though the upper part is clearly missing in the physical surroundings) based on its geometrical properties. This mental operation, however, does not apply to all examples in which not all of the TR is contained within the LM (*'nail in the board'; 'a golf club in someone's hand'*) (ibid., pp. 73-75).

The author also dedicates a chapter to the directional meaning of *'in'*, comparing it to *'to* and *'into'*. Much like *'u'* + acc., *'in'* and *'into'* in dynamic contexts typically indicate that

the LM (which has a boundary and an interior) is the Goal of the TR's action. According to Linstromberg's observations, when we use *'in',* the LM that follows is more detailed than an LM following *'to'*. Therefore, *'It took you ten seconds to run to the tree and back'* does not call for a detailed interpretation of the shape of the tree. In fact, we can be fairly certain that the role of the tree is not that of a container, nor does it enclose the TR at any point. However, *'She went to the library'* presumes that the person also e*ntered* the library. This interpretation is based on our pre-existing knowledge on and experience with libraries (ibid., p. 31). I would argue that *'to'* is still preferred in such contexts for similar reasons. Despite the shape or the function of the library, which differs from the function of the tree in the previous example, we do not conceptualise the Goal of the action exclusively as the person's entrance in a container-like structure. In other words, it is not necessary for the interlocutor to focus on the containment function of the library, but we want to highlight the end Goal specifically – she went (outside) with the purpose of ultimately reaching her Goal (the library is the end point of her action). Similarly, when the shape and the function of the LM are less important, we use *'do'* in Croatian (*'Otišla je do knjižnice.'*).

When it comes to the distinction between *'in'* and *'into',* Lindstromberg explains that dynamic constructions containing *'in'* are more focused on the end result (the relation, i.e. the TR (eventually) being enclosed by the LM), whereas *'into'* is more dynamic and highlights the movement. Hence, we can say that someone *'slept in* (but not 'into') *the car' a*nd that someone *'crashed into a tree'*, but not *'crashed in a tree'*. Furthermore, *'into'* always implies the crossing of a boundary, which does not hold true for *'in'* (*'We jumped in the train.'* – We were already in the train vs *'We jumped into the train.'* – We jumped from the platform and into the train). Note that the difference might be much more subtle, and is not necessarily related only to crossing a boundary. It is natural to say *'We got in the car'*, in which case the TR also crossed a boundary, but the distance is much shorter and the boundary is easier to cross than in contexts

that would require *'into'*. *'Into',* unlike *'in',* is also used to express c*ontinued penetration* (*'We drove deeper into the forest.'*) (ibid., pp. 32-33). As already stated, Croatian does not make these distinctions and encodes all of these relations with *'u'*. The nuances in meaning are expressed by other linguistic means, such as the verbs themselves, their prefixes, adverbs or other clausal elements.

All things considered, we can conclude that the meaning of *'u'* + locative in static spatial scenes partially overlaps with the English prepositions *'in'* and *'at'*. As previously explained, *'at' c*orresponds to either *'u'* or *'na'* in Croatian, based on other properties of the scene. The English equivalents of *'u'* + accusative in dynamic scenes overlap with *'on', 'at' 'into'*, but also *'to'* (which is typically translated into Croatian with *'do'*, but various prepositions can be used, depending on the context).

## 4. Previous crosslinguistic research on spatial language

In the previous chapters, we have been discussing the similarities and differences between Croatian and English in terms of various meanings attributed to *'na'* compared to 'on' and *'u'* compared to *'in'*. Some of these differences seem to be related to different modes of spatial conceptualisation between the speakers of these two languages.

Researchers in the field of Psycholinguistics have been trying to test the existence of universal base meanings of spatial prepositions for over thirty years. The common assumption is that spatial relations can be organized into 'meaning clusters' by combining various semantic features originating from our universal, bodily experience (Brala, 2000; 2007 in Brala-Vukanović 2013, p. 193). These features (referred to as 'anthropomorphic factors' by Vandeloise) are often given the name of 'embodiment' in Cognitive Linguistics (Johnson 1987; Lakoff 1987; Ziemke, Zlatev, and Frank 2007; Frank, Dirven, Ziemke, and Bernárdez 2008 in Langacker, 2010). When combined with Croft's ideas on conceptual space reflected in specific parts of speech (and syntax in general), these claims help us analyse topological relations in a fairly systematic manner. According to the Semantic Map Connectivity Hypothesis, a language is likely to group together different contents on a 'semantic map' and express them with similar or overlapping means, essentially creating a continuum (Croft, 2001 in Fortescue, 2021, p. 2). In supporting his position of a 'universal topologist' (a position that reconciles, but also disproves, both extreme relativists and extreme universalists), Croft developed a type of analysis applicable to empirical research, which he calls 'the semantic map model in typology'. It is, at its core, a distributional analysis, but applicable to various languages, which then become much easier to compare. In other words, it provides an overview of semantic features of linguistic units in a specific category (e.g. indefinite pronoun forms), identifying the semantic 'cut-off points' for each form. The result is typically a regular pattern, which Croft names 'conceptual space'. Conceptual space can be represented in the form of a graph (a

semantic map), from which it becomes clear how the meanings overlap or differ, separating the language-specific from language-universal (Croft, 2003, Haspelmath 2003 in Croft, 2010).[1]

Arguably the most famous attempt to formulate a universal continuum of topological spatial relations was made in 1992 by Bowerman and Pederson. The authors created a set of images showing a TR and an LM, whose topological relations can be lexicalised with the English prepositions *'on'* and *'in'*. The pictures were then used as elicitation materials in order to compare how such relations are encoded in 33 different languages. Eventually, 11 categories were created, ranging from 'support from below' to 'inclusion'. The boundaries were drawn whenever the researchers noticed that one of the examined languages 'switched' from one preposition to another to describe the relation (e.g. the type of support, attachment, inclusion and so on) (Bowerman & Pederson, 1992 in Brala-Vukanović, 2013, pp. 192-193). Even though differences were observed within the continuum among the tested languages, these differences were fairly systematic, which is in line with Craft's theories (Feist, 2010). It is important to know that the work of Bowerman and Pederson is largely based on geometrical features of spatial scenes (such as the shape of the LM, the proximity of the TR to the LM and so on), which we have already established to be insufficient. The function of the LM and the location control, for instance, were already discussed earlier in this thesis, and more elements will be analysed in the following sections. Nonetheless, their work has since been a starting point for numerous studies (and further elaboration) on spatial semantics. Their elicitation tool yielded a substantial amount of research on many world languages (including sign language (Eberle, 2013)), in attempts to systematically describe topological expressions of a specific language (Nilsson, 2013) or even to challenge the idea of universal spatial semantics (Bowerman & Choi, 2001, Feist, 2010; Levinson et. al., 2003). Levinson et. al (2003, pp. 495-

[1] Note that Croft also points out the constraints of such an analysis and advocates the use of Multidimensional scaling. For an in-depth explanation and comparison, see Croft (2010).

514) in particular not only tested the premise that core-meanings of adpositions (prepositions like *'on', 'in', 'under'* etc.) are shared among all languages, but disproved it. An analysis of simple spatial prepositions across only a small number of languages failed to result in a perfect overlap, which did not allow for descriptions of universal, prototypical meanings. The researchers then proceeded to test the assumption that the underlying conceptual organisation of space remains coherent, despite the fact that the 'cut-off points' vary significantly across languages. In other words, the boundaries are formed around naturally salient elements, hence the 'neighbourhood' relations are relatively fixed. Simply put, the 'scale', or the continuum of relations should be universal. Even though this theory was not proven, the researchers conclude that it is not implausible in itself. They were unable to establish a coherent continuum, but argue that this does not mean that such a continuum cannot be created in general. Finally, by using Multidimensional scaling, the authors of the study aimed to explore whether sets of images ascribed to a certain adposition (used by a significant number of participants) somehow 'cluster' together. Some clusters did emerge, proving that a set of general 'attractors' (such as proximity, attachment, super- and sub-adjacency and full containment) must have an influence on how speakers of different languages group spatial relations together. Like many others, the researchers point out that the functional aspect of relations (which may even be culture-specific) must be taken into consideration.

Further complicating the issue is the existence of various linguistic means to express differences in (spatial) meanings, which exceed the scope of this research, but have to be taken into consideration when we discuss universality across languages. In some languages, we find these distinctions only in varying phonological markers, or 'tonal changes' (Nilsson, 2013, p. 14). Another commonly overlooked linguistic phenomenon are the so-called general spatial terms (GSTs) (Feist, 2010), also known as 'general locative markers' (Nilsson, 2013), which are significantly different from specific prepositions traditionally taken into consideration.

Unlike specific spatial terms, GSTs do not contain specific information about the relation between the TR and the LM, but serve simply to indicate that there exists some type of a relation (Feist, 2010), whose meaning is pragmatically understood, i.e. inferred from the context (Nilsson, 2013). They are frequently glossed as *'in', 'on'* or *'at'*, but this is an inaccurate interpretation, as a) using specific prepositions transfers what is left unspecified in the source language and b) in some cases, there is no specific preposition that encompasses all of the potential meanings of the GST. They have been proven to be sensitive to various components of the spatial scene, such as geometric, functional and qualitative physical factors, but it remains relatively unclear how they should be approached and contextualized when discussing universal spatial concepts. The existing body of research, however, suggests that the meanings of these two types of spatial expressions converge to a certain extent. These findings imply that there is a potential universal tendency to group together certain attributes of spatial scenes, regardless of the type of expression that is used (Feist, 2010).

If we were to, for the purposes of this thesis, ignore the existence of GSTs and focus only on specific prepositions, research still provides mixed results. The abovementioned Feist's study led to a strikingly similar continuum to that created by Bowerman and Pederson upon a close analysis of specific spatial expressions across 24 languages pertaining to 11 language families. When studying Latvian and Lithuanian (both Baltic languages), Žilinskaitė-Šinkūnienė, Skilters and Zarina (2019) found that geometrical stimuli are interpreted and encoded relatively similarly in these two languages. If some variations in answers did occur, they were typically found in both languages (pp. 248-249). Nonetheless, we must keep in mind that this particular research was limited to geometric relations (the stimuli comprised a set of images representing two circles in various relations to one another), which fail to provide full insight into real-life topological relations between objects. On the other hand, some data indicates that there are noteworthy differences even among typologically similar languages.

English and Dutch, for example, are both Germanic languages that share many grammatical and lexical properties. However, Dutch uses three distinct prepositions to encode relations of contact and support, all of which would typically be described with *'on'* in English. In other words, NSs of Dutch take into consideration additional elements of the spatial scene, that do not seem to be as relevant for English speakers, including encirclement of the LM by the TR, the specific way in which the TR stays in contact with the LM, the (perceived) stability of the TR's position (i.e. the presence/absence of an underlying force that the TR needs to resist in order to maintain its position), etc. If we broaden the comparison to topologically different languages, we observe even greater differences. The switch from *'in'* to *'on'* is found much further down the continuum in Finnish than it is in English. This cut-off point would, for instance, place *'a handle in* (instead of *on*) *a pan'* in Finnish due to its intimate contact with the LM (Bowerman, 1996, pp. 150-157). Similarly, some significant differences were found between English and Mandarin. Despite some individual variations in answers, the overall pattern indicates that there are a few groups of relations typically perceived as support in Mandarin, that would be interpreted as relations of containment in English. Such divergences are found for relations described by Herskovits (1986) as showing gaps or objects embedded in physical objects (e.g. holes and cracks in LMs; *'nail in board'; 'flowers in hair'*). Whereas English speakers predominantly focus on enclosure, or containment, speakers of Mandarin view such LMs as providing a supporting surface for the TR (a two-dimensional view of the relation). Relations of partial inclusion are another similar example (*'cork in bottle'; 'lightbulb in socket'*), and the saliency of support in Mandarin might be explained by the fact that most of the TR is visible, i.e. its inclusion in the LM is limited. It has also been shown that objects present in the crown of a tree are still viewed and encoded as relations of support by Mandarin speakers, as opposed to the tree (crown) being viewed as a container with borders in English. Conversely, an image showing food on a plate was predominantly described with *'in'* by the

Mandarin speakers, which may be a culturally-specific difference (Zhang, 2013, pp. 45-48). Further work on these two languages (by the use of multidimensional scaling) confirmed Zhang's conclusions on the Mandarin preference of *'on'* over *'in'* in particular categories of relations, as well as revealed differences in the prototypical conceptualisation of inclusion (three-dimensional in English and two-dimensional in Mandarin) (Feist & Zhang, 2019, pp. 1720-1722).

So far, we have mostly observed how certain elements of spatial scenes yield different descriptions (and potentially different conceptualisations) in English, Dutch, Mandarin, Finnish and so on. In some other languages, such as Mixtec (spoken in Mexico), linguistic encoding of space is dependent on even subtler nuances. The shape of the ground object, for example, will also have a strong influence on the choice of the locative expression. (Bowerman, 1996, pp. 157-158).

These divergences across world languages do not point to differences in spatial conceptualisation only on the basis of different 'cut-off points', but also because they are present very early on in first language acquisition. If we assume that spatial meanings are semantic universals, due to the fact that they are grounded in our bodily experience, we would also have to prove that child speakers of various L1s encode spatial information relatively similarly. For instance, it has been noted that spatial meanings arise in a fairly constant order and at a similar rate, regardless of the language being learned (Slobin, 1973 in Bowerman & Choi, 2001, p. 476). We therefore observe quite a similar pattern in how spatial terms develop (the order, as well as pace of acquisition) across various languages. For example, containment is one of the first topological relations that children learn to encode in language, whereas 'projective relations' (such as *'in front of'* and *'behind'*) are among the last. Furthermore, children use spatial terms in a considerably different way than adults (e.g. errors such as overgeneralisations occur frequently). When taken together, these findings might lead us to

believe that children simply map pre-existing, universal spatial concepts onto linguistic expressions, but this is not the case. Firstly, this evidence does not rule out the possibility that some of these errors occur not only because children lack real-world bodily experiences, but also because they are unable to properly comprehend and interpret linguistic input, i.e. cope with *linguistic* spatial categorization. Secondly, empirical studies based on children's spontaneous speech production have shown that the 'cut-off points' discussed earlier (what 'counts' as containment or support, for example) are, despite some general rules and patterns, not necessarily dependent on the physical properties of scenes or objects. In some cases, they are precisely the result of particular characteristics of a given language. Language-specific encoding of spatial relations (including language-specific errors) occurs as early as the one-word stage of L1 acquisition, proving that cross-linguistic variations play an important role in the development of spatial language. In fact, the way in which children linguistically encode spatial scenes seems to be more related to the properties of their L1, than it is to their age. When comparing three groups of young children (NSs of English, Dutch and Korean) to one another, as well as to the adult speakers of their L1, Bowerman and Choi found that there are more similarities between the spatial language of young and adult speakers of the same language, than between children with different L1s. Finally, children show signs of sensitivity to language-specific categories as early as 18 months, proving that they are able to comprehend language-specific spatial information much sooner than they are able to accurately use it in production (Bowerman & Choi, 2001, pp. 477-497).

## 5. The acquisition of prepositions in L2

Given their complex semantic nature, it is not surprising that prepositions are among the most difficult aspects of L2 to acquire. Due to varying saliency of elements present in a scene, different cut-off points on the continuum and, apparently, different underlying organisation of spatial concepts, it is notoriously challenging to both learn and teach L2 spatial expressions. Prepositions, unlike syntax, or other elements of L2 grammar, cannot be presented through a set of rules, but require the learners to understand a considerably different system of thinking and perception. NNSs, even at high levels of proficiency, make numerous mistakes when it comes to English prepositions.

Difficulties with *in* and *on* occur frequently, especially in terms of successfully determining the border between these spatial categories (Harthford, 1987 in Zhang, 2013, p.65). This is especially true if the speakers' L1 has significantly fewer prepositions, whose meanings are more constrained when compared to their English counterparts. One such language is Arabic, and Mukattash (1985) found that this cross-linguistic variation inevitably leads to errors related to distinguishing between *'in', 'on'* and *'at'*, as well as overgeneralizations, which are a direct transfer from learners' L1 (pp. 48-52; 59). Inappropriate equivalence is also identified as one of the prevalent types of errors made by NNSs of English in Mahmoodzadeh's (2012) research on Persian EFL learners, closely followed by redundancy. Additionally, it was noted that Iranian students sometimes tend to omit a preposition in English when translating from their L1 (pp. 737-738). Similar types of errors attributed to L1 interference seem to occur in most languages, such as Georgian (Gvarshavili, 2013, pp.1567-1568), Spanish (Catalán, 1996, p. 9), Finnish and Swedish (Jarvis & Odlin, 2000 in Zhang, 2013, p. 108), despite the fact that all of these languages differ typologically.

Whereas all of these studies pay attention to lexical and syntactical differences between learners' L1 and English, and some even analyse specific contexts in which errors are more likely to occur (Catalán, 1996, pp. 11-13), very few focus on spatial meanings of prepositions specifically, and even fewer delve into potential differences in conceptualisation. One such attempt was conducted in 2010 by Munich and Ladau, who based their study on a gap-fill task related to a set of pictures (as opposed to translation tasks traditionally taken into consideration). Their elicitation tool led to interesting conclusions. After looking at the elicited descriptions made by NSs of Korean and Spanish, the researchers found that the border between *'on'* and *'in'* was problematic for all learners who started learning English later in life (at the age 8-13), regardless of the amount of exposure to L2. Some errors, however, seemed to be directly linked to only one of the investigated L1s (as they were group-specific). These errors were assumed to occur precisely due to differences in conceptualisation (or, more specifically, due to different functional aspects of reference objects that tend to be salient in a language) (Munich and Ladau, 2010 in Zhang, 2013, pp. 66-67).

Building on her work already presented in this thesis, Zhang (2013) decided to explore whether certain difficulties in the way in which NSs of Mandarin use the English prepositions *'in'* and *'on'* can be linked to differences in spatial conceptualisation. The participants were asked to select the most appropriate preposition for the description of 42 different pictures chosen from her previous study. She discovered that L1 Mandarin speakers of English made the most errors when asked to choose the correct preposition for pictures that are described with *'on'* in Mandarin, and *'in'* in English. This category of items (referred to as ON-IN subset by the author) overlaps with the category of relations where the biggest differences between Mandarin and English were observed in terms of spatial conceptualisation in general. In other words, if the speakers were more likely to focus on support instead of containment in their native language, this was reflected in the way in which they (wrongly) described the item in

English. However, we must be careful when interpreting these findings. We must keep in mind that this particular category of relations can be 'ambiguous' for NSs of English as well – even though they would typically be lexicalised with *'in'*, the function of containment (albeit salient in English) is not as straightforward as it is in relations of complete enclosure. Furthermore, these errors could be related to the frequency of expressions present in the linguistic input. For example, it is arguably less common to hear an English speaker state that *'a crack is in a mug'* or that *'a bird is in the tree'* than to hear the preposition used in more prototypical examples.

Interestingly, the results of the study also imply that L2 proficiency was not directly associated with the appropriate use of *'in'* and *'on'* in English (pp. 71-93). Elkasović (2020), on the other hand, presents contrasting data. She found a statistically significant effect of the level of proficiency when analysing the frequency and type of errors in the usage of English prepositions by Croatian university students. Even though her research was not limited to *'on'* and *'in',* and was predominantly focused on temporal meanings of prepositions, the instrument also included some sentences containing spatial prepositions. Based on two different tasks (translation and gap-filling), it was observed that students of English language and literature made significantly fewer errors (a total of 10.86%) when compared to students of other faculties and departments (19.12%). Interestingly, participants in both groups made more errors in the gap-filling task than in the translation task, which is especially true for the second group (47.92% more errors were made in the gap-filling task). The types of errors also demonstrated a similar pattern – the subjects mostly made errors of substitution (65.98%), followed by omission (27.80%). The majority of these errors was attributed to L1 interference, or literal translation (what some other authors name 'inappropriate equivalence').

## 6. Distributed spatial semantics and the importance of verbs in locative expressions

In their work 'Distributed spatial semantics', Sinha and Kuteva (1995) harshly criticize the so-called 'local semantics' approach to the analysis of spatial language. In their view, spatial information is not carried exclusively in locative expressions, i.e. spatial prepositions, but distributed across the entire phrase. If this were not the case, the meaning of a preposition would essentially be independent of the context in which it occurs. The preposition *'in'* would therefore signify the same spatial relation in the expression *'fruit in a bowl' a*nd *'a crack in a bowl'*. We are, however, perfectly aware that the relations encoded by the same preposition are not identical. This awareness partly stems from our everyday, bodily experience – we know that a crack lacks voluminosity when compared to fruit, and can therefore not lay in a bowl in the same way as pieces of fruit. In some languages, such as Dutch, a change in the word order changes the spatial meaning of the entire phrase (in Nilsson, 2013, p. 6).

As we have already observed, when it comes to Croatian (and other inflectional languages), the meanings of prepositions are always analysed in conjunction with the noun phrase that follows, while paying close attention to the case (Šarić, 2008; Svaćko, 1993). In addition to the properties of the TR, we must carefully observe various aspects of the LM (both semantic and lexical) in order to correctly encode, or interpret the encoded relation. We have already discussed the importance of function in spatial relations outlined by Vandeloise (1991), which is essential for the meanings of prepositions (in Langacker, 2010). In summary, looking at prepositions in isolation is insufficient, and we must always analyse not only the relation established by a preposition, but also the very elements that they put into relation (Herskovits, 1965 in Brala-Vukanović, 2013, p.189). Langacker (2010) further extends the debate, arguing that a considerable portion of spatial information is frequently carried by verbs. Consider, for example, verbs such as *'support', 'contain'* or *'hold'*. By using such a verb in an utterance, we essentially foreground the LM, thereby encoding it as the TR (the subject of the sentence),

whereas what would normally be considered the TR is used as the reference object (and is, hence, 'backgrounded'). For example, if we contrast *'The kitten is in the box'* with *'The box contains the kitten.'*, we can see that the choice of the verb has not only changed the word order, but highlighted the function of containment, instead of the thing (the kitten) that is being contained. Langacker refers to the choice between the TR and the LM as 'the alignment question', stating that the basic distinction between these two notions is the potential for movement (or replacement), which is often, as we have just seen, expressed within the verb. In *'The kitten is in the box',* the kitten is the TR because it can change its position (i.e. exit the box and go somewhere else). *'The box contains the kitten',* on the other hand, leaves an alternative for 'the box' – it can be moved somewhere else and contain something else. Despite some evidence that spatial factors of a scene might have a degree of primacy, spatial and interactional factors are virtually inseparable. Linguistic encoding of spatial information is always driven by an underlying conception of how we would interact with the objects or how they would interact with each other (how an object got to its location, how it can change its position, be removed, etc.). Spatial concepts are therefore never purely static, but are always conceived as having a dynamic character. This is often reflected in how we speak about topological relations – we could say, for instance, that a crack *runs* from one point in space to another, even though the crack itself is not moving. This is known as 'fictive motion', and it is a reflection of how we trace the spatial extensions of objects when we observe an essentially static relation.

We can conclude that the meaning of prepositions is inseparable from (and dependent on) the type and the meaning of the verb that it occurs with in a sentence. In fact, most of the examples that we have discussed in previous chapters contained different verb types that helped us analyse the topological elements, and we have even distinguished between static and directional meanings of *'na'* and *'u'* and their English equivalents.

Prepositions also play an important role in verb framing, often functioning as the so-called 'satellites'. Without satellites, the meaning of verbs would be incomplete, i.e. left unspecified. This is especially true for the so-called 'satellite-framed' languages (Talmy, 2000 in Vandeloise, 2017), that encode various elements of motion events in a non-verbal element. Both Germanic and Slavic languages are generally considered satellite-framed (Slobin, 2004 in Ameka & Essegbey, 2013, p. 20), even though there is empirical evidence that some, such as Serbian and Croatian might not fall neatly into this category (Fayard, Stošić and Cerutti, 2017; Vekerk, 2014; Filipović, 2010; 2017 in Žufić, 2017). In the context of this thesis, we can largely ignore the on-going debate on the accuracy of Talmy's categorization of languages, as we will be dealing with more straightforward examples, and predominantly focus on static spatial relations.

Nonetheless, these structural differences between languages can reveal a lot on how NSs of different languages differ in terms of their 'thinking for speaking'. Slobin (1996, pp. 76; 90-91) uses this term to refer to a mental operation that takes place when the users of a language need to formulate utterances for the purposes of communication. Slobin argues that the concepts in our mind take on a different quality (i.e. become 'mobilized for communication') when they need to be organized in order to express, or speak about, our experience. Some of these differences can be experienced through the senses (e.g. singular vs plural), whereas others do not have a corresponding physical aspect ('went' vs 'has gone'). The latter category is truly 'thinking for speaking' because, according to Slobin, these differences only become important when we need to encode them linguistically. In order to explore how children with various L1s (English, Hebrew, German and Spanish) encode the same sequence of events, Slobin presented them with Mayer's (1969) picture book *'Frog, Where are You?'*. He was eventually able to place languages on a continuum based on how they encode various aspects of events. He found that children showed signs of sensitivity to various aspects of the

events that seem to be linguistically-driven by paying 'selective attention' to those aspects that are grammaticized in their L1. In summary, it was established that *'categories that are not grammaticized in the native language are generally ignored, whereas those that are grammaticized are all expressed by children as young as three'* (p. 83). When comparing spatial descriptions provided by the children, he found that NSs of English express the manner of the action, as well as change of location with a verb, whereas particles and prepositions express the Path of an action. In Spanish, on the other hand, prepositions provide minimal locative specification, as Path or directionality are expressed within the verb itself (pp. 84-89).

The semantic interdependence of verbs and prepositions is often taken into account in research on spatial semantics, especially in cross-linguistic studies. Bowerman and Choi (2001, pp. 480-484) note that the semantic cut-off points related to spatial conceptualisation are often reflected precisely in verbs – more specifically, in how various languages encode motion along a path. In their study, they looked at verbs of joining and attachment, and found that English (a satellite-famed language) expresses motion along a path through various prepositions and particles, whereas Korean (a verb-framed language) relies mainly on verbs themselves. They analyse the Korean verb *'kkita'*, which is used to express an action of interlocking two objects with complementary shapes. While Korean requires a single verb to express such a complex notion, we cannot find a single, corresponding morpheme in English. Instead, speakers of English resort to the usage of *'put'* in conjunction with *'in'* or *'on',* with no way of encoding all relations that fit into this category with a single verb. In other words, English requires different prepositions in order to refer to different objects or types of relation. The abovementioned differences between languages also allow for a distinction between 'tight' and 'loose' fits between objects in Korean that we do not find in English. Additionally, Korean seems to be sensitive to a distinction in Path, depending on whether the action is accidental or deliberate, i.e. spontaneous or caused.

### 6.1. Verb-preposition collocations in the Croatian language

Slavic languages are, in this sense, closer to English than to Korean or Spanish. Spatial meaning is distributed across a phrase, and Path is typically encoded with particles and prepositions. While studying the encoding of motion events in Russian, Talmy (1985; 2007 in Blagus Bartolec, 2020, p. 521) observed a particular collocation pattern, consisting of a prefixed verb of motion and a preposition in which the verb prefix and the preposition are repetitive (i.e. homonyms). The presence of similar linguistic structures has since been noted in other Slavic languages, including Croatian (e.g. *'ući u' ('enter into'); 'izaći iz' ('enter from'); 'prebaciti preko' ('toss over')*). Despite having received some attention recently (Brala-Vukanović & Rubinić, 2011; Brala-Vukanović & Memišević, 2014; Blagus Bartolec, 2020), this phenomenon has not yet been extensively studied. From the semantic viewpoint, motion verbs are the second-largest verb category in the Croatian language (Brač & Bošnjak Botica, 2015, pp. 112-113), preceded only by verbs of thinking and knowing. Since multiple studies have shown that semantic properties of words and expressions are typically reflected in their syntactic properties (e.g. verbs similar in meaning are also similar in terms of their syntactic 'behaviour' (ibid. pp. 115), a more comprehensive analysis of this specific collocation pattern could be crucial for a better understanding of how NSs of Croatian conceptualise and express the relation between space and motion.

Brala and Memišević (2014), approach the issue from a cross-linguistic perspective. They decided to conduct a comparative-contrastive analysis of English path verbs in relation to their Croatian equivalents, mainly focusing on structures in which the central elements of Path are expressed both in the PP and in the verb itself. In Croatian, this is sometimes reflected precisely in the repetitive pattern we have been discussing in this section. The authors decided to group the verbs (taken from corpora) on the basis of their semantic properties in order to search for consistencies in terms of their verbal, i.e. syntactic, behaviour with respect to PP

selection in both English and Croatian. It was hypothesised that some of these verbs are more syntactically constrained precisely due to their semantic properties (pp. 176-177). They found that it was possible to further sub-categorize English Path verbs on the basis of whether they could be translated into Croatian with this repetitive structure (prefixed verb followed by a PP in which the preposition is a cognate of the prefix) or not.

The following conclusion seems to be valid for both literal and metaphorical contexts: In general, the 'closeness' to, or rather, the dependence of a verb on the notions of Source and Goal can serve as a good indicator of its (systematic) syntactic behaviour. More specifically, Source and Goal verbs appear to be completely systematic in terms of their syntactic behaviour, closely followed by verbs of division, and lowering and elevation. As we gradually move away from the notions of Source and Goal (division; lowering and elevation → approaching target → continuation and target distance → merger and circular → area verbs), the level of syntactic systematicity also seems to decrease (ibid. pp. 190-193). In terms of the Croatian repetitive pattern specifically, we can observe that Source and Goal verbs are typically followed by a PP in which the preposition is a cognate of the prefix (*'izići iz'; 'otići od'; 'ući u'; 'doći do'*). This is also true for lowering verbs (*'sići s'*), as well as some elevation verbs (e.g. *'popeti se po'*), but not all (*'(u)zdići se'; 'ustati'*). We do not observe such a pattern for continuation verbs (*'nastaviti'; 'napredovati'*), or for verbs that express approaching a target (*'približiti se'*). Some merger and division verbs can take a cognate preposition (*'spojiti s'; 'odvojiti od'*), but others cannot (*'pridružiti (se)'; 'razdvojiti'*). The same can be said about target distance, circular and area verbs (ibid. pp. 178-190).

As we have established, the repetition of the prefix in the form of a preposition is not always necessary in Croatian. In fact, a prefixed motion verb can: a) require a prepositional locution; b) require a direct/indirect object or c) occur with a prepositional locution or a direct/indirect object. Brala and Rubinić (2011) decided to conduct a study focusing on the

final group of prefixed motion verbs, as it could provide the most valuable insights. If speakers are left with a choice whether to repeat the prefix in the form of a preposition or not, their choice can help us understand which linguistic situations call for this repetition, as opposed to those where repetition is considered redundant (ibid. pp. 24-25).

Based on two separate studies (Brala, 2000; Rubinić, 2009), the authors conclude that only verbs with spatial extension allow both constructions (unlike, for example, *'dokrajčiti'*, which cannot occur with the preposition *'do'*, but can only be followed by a DO). The pattern described in 'c)' above can therefore only occur with prefixed verbs that also express a motion along a Path. It was also found that, while both patterns (repetitive and unrepetitive) are viewed as grammatically acceptable, they do express (or at least, highlight) different components of the action. The unrepetitive pattern, for example, seems to focalize the (ease of) achievement, the fact that the action was not necessarily limited to the object, the aim/intention of the action, and implies more consequences for the object. The repetitive pattern, on the other hand, highlights the spatial component of meaning, implies that the action was probably limited to the object, points to the manner of execution (and not to the action itself), and has more consequences for the subject/agent. When taken together, the results seem to suggest that the central semantic component contained within the preposition is the Path (or rather, various elements of Path) of the action expressed by the verb. The prefix, on the other hand, expresses a sense of completion, a notion which is closely related to the elements of the Path (its directionality) (ibid. pp. 25-33).

While these studies significantly contributed to the understanding of this phenomenon, what causes the speakers to *use s*uch repetitive collocations when describing an event or a spatial scene remains relatively unclear.

## 7. The present study

### 7.1. Aims

This study was first and foremost motivated by the lack of empirical research conducted on the semantics of Croatian prepositions. The existing body of research mostly consists of theoretical frameworks and assumptions or, at best, corpus analyses. While these methods are valid and useful, few researchers have chosen to focus on natural, spoken interaction, which could contribute to a more comprehensive understanding of how NSs of Croatian conceptualise and, in turn, express spatial relations. Such studies could both lead to more precise conclusions on the prototypical, or primary, meaning of Croatian prepositions (given that one of its defining criteria is precisely speakers' intuition, i.e. their spontaneous usage of a preposition to describe a relation), as well as help clarify the common consideration of simple prepositions as semantic universals. Moreover, it will help us determine which elements of spatial scenes seem to be salient in Croatian on the basis of empirical evidence. By using the BowPed picture series (Bowerman & Pederson, 1992), the present study provides a good means of comparison between Croatian and other languages and allows for further research by using a broadly accepted and frequently used visual stimuli to elicit the responses. Additionally, the study will provide insights into the way in which NSs of Croatian lexicalise the tested spatial relations in both their L1 and L2.

The first aim of the study is therefore to define the key semantic features of the Croatian prepositions *'na' ('on')* and *'u' ('in')* and help distinguish between the most prototypical topological relations encoded with said prepositions, and more borderline examples. Secondly, the paper will present the findings on the potential borders between categories of spatial relations in Croatian (i.e. the cut-off points that trigger a change of preposition), and compare them to the English 'on-in continuum'. Thirdly, the study will investigate which linguistic elements other than prepositions are used in Croatian in order to lexicalise topological relations

in natural, spoken production. Finally, this research is aimed at comparing the encoding of spatial relations in English by NNs of Croatian based on their level of L2 proficiency.

### 7.2. Research questions and hypotheses

The present study will try to answer the following research questions:

1) Which locative expressions will be used by NSs of Croatian in order to encode topological relations from the 'on-in continuum' designed by Bowerman and Pederson?
2) Which of the images will cause a change of preposition, thereby defining a Croatian cut-off point on the continuum, and how similar will they be to the borders identified for the English language?
3) Will more proficient speakers of English produce more native-like descriptions of the images when compared to learners with a lower proficiency level?

Three separate hypotheses were drawn from these research questions:

1) NSs of Croatian will predominantly use prepositions *'na'* and *'u'* followed by the locative case in order to encode topological relations exemplified by the pictures. Some descriptions may contain a verb in its passive form and a PP.

The first hypothesis was based on Šarić's (2008) in-depth analysis of the Croatian prepositions *'na'* and *'u'* and various contexts in which they typically occur. Most of the pictures used as elicitation tools fall into one of the categories of topological relations outlined by the author. Secondly, previous crosslinguistic research on specific spatial terms presented earlier in the paper suggests that speakers of a large number of world languages tend to encode these relations with some forms of *'in-on'* equivalents. Finally, the hypothesis is grounded in the idea of distributed spatial semantics, which, in the context of the Croatian language, means that the

noun following the preposition will be inflected (in the locative case, which is typical for static contexts in which *'na'* and *'u'* tend to occur). It is also reasonable to assume that the spatial meaning encoded by the participants might extend to the usage of verbs as well, and that some of the descriptions may include a prefixed verb followed by a PP in which the prefix is the cognate of the preposition.

2) Croatian and English image schemas will largely overlap, especially in terms of the end points of the 'on-in' continuum. However, we will presumably observe some intra- and interlinguistic variations in answers pertaining to relations of partial inclusion and ruptures in LMs.

The second hypothesis was based on previous findings (Bowerman & Pederson, 1992; Bowerman, 1996; Bowerman & Choi, 2001, Levinson et. al, 2003; Feist, 2010, Zhang, 2013), as well as notable correspondence between *'na'* and *'on'* and *'u'* and *'in'*. However, there is not always a perfect overlap in meaning between these prepositions. Moreover, a small-scale pilot study revealed that some of the images may be more ambiguous and less straightforward for NSs of Croatian, allowing for the lexicalisation of specific relations with either *'na'* or *'u'*. Additionally, the preliminary results showed that Croatian spatial conceptualisation of particular relation categories may be more similar to Zhang's (2013) findings on Mandarin than to the underlying image schemas typical for English.

3) Participants with higher proficiency levels will provide more native-like descriptions when encoding the relations in English.

Even though Zhang (2013) found that proficiency did not have an influence in how L1 speakers of Mandarin encoded spatial relations in English, leading to similar errors regardless of the group, Elkasović (2020) suggests that proficiency is a relevant factor for NSs of Croatian. Given that her study mostly focused on temporal meanings of prepositions, which tend to be

more difficult to master in L2, it was reasonable to assume that encoding of spatial relations would be less problematic, and that higher levels of proficiency would reduce L1 interference. Moreover, Zhang (2013) highlights that some of the errors identified in her study might be attributed to less frequent exposure to certain contexts in which *'on'* and *'in'* may occur. Since the participants with higher level of proficiency in the present study were predominantly students of English language and literature (or those who have already majored in English language (and literature)), it is expected that both their input and output in the Target language are more extensive, and comprise a wider variety of linguistic situations. Due to their age, they have also been exposed to English for a longer period of time when compared to high-school students, who were tested as the second group.

### 7.3. Participants

A total of 31 participants took part in the study. Their age ranged from 15 to 35 and they were all native speakers of Croatian. In total, there were 12 male (38.7%) and 19 female (61.3.%) subjects. They had been studying English for at least six, and up to 19 years. When asked to estimate their proficiency levels on a scale 1-4 (1 - elementary; 2 - average; 3 - very good and 4 - excellent), the majority of participants described their English language knowledge as either very good (46.2%) or excellent (46.2%), with only two participants stating that their knowledge could best be described as elementary. The reported data refers to valid percentages, as five participants failed to provide some of their background information.

The participants were divided into two groups: The first group consisted of advanced Croatian speakers of English, with an estimated level of proficiency of C1 – C2 in the CEFR. They were either M.A. students of English Language and Literature at the Faculty of Humanities and Social Sciences in Rijeka, those who have already completed their M.A.

programme, or those who have taken the Cambridge Proficiency Exam this year and have obtained their C2 level certificate. Even though a proficiency test was not administered to the participants as a part of this study, their qualifications, as well as their frequent and extensive exposure to and the usage of the English language can be used as a sensible assumption of their level of proficiency. This group consisted of 14 participants in total, 4 of whom were male and 10 female, with an age range 23-35, and a mean age of 25.36, or a median of 26, with the standard deviation of 3.104. The largest number of the participants in the first group had been learning English for 17 years when the research was conducted.

The second group consisted of Croatian high-school students, aged 15-17, whom I have taught during 2020 and 2021. They were all in their first or second year of high school education at the moment when the research was conducted. Their estimated proficiency level is A2-B1, since most of the teaching and assessment materials are specifically designed to fit this framework, even though it can be assumed that some of them could be more advanced and capable of coping with B2 level tasks and assignments. However, these potential individual differences should not have a significant effect on the results, as it is highly unlikely that they would call into question the division of the participants into these two groups (we can still compare ‘proficient’ to ‘independent’ users). The second group consisted of 17 participants in total, 8 of whom were male and 9 female. Their age ranged from 15-17, with a mean age of 15.88, a median of 16, and a standard deviation of 0.485. Most of them had been learning English for 10 years.

## 7.4. Instrument and Methodology

### 7.4.1. Instrument

As stated earlier in the text, the set of images used to elicit the responses was chosen from the BowPed picture series (Bowerman & Pederson, 1992), retrieved from the website of the Max Planck Institute for Psycholinguistics. Out of 71 items in total, 32 were tested for the purposes of the research, whereas additional 22 were used as filler items. The images were chosen so they would fit the aims of the study, based on a small-scale pilot conducted with some friends and family members, all of whom were native speakers of Croatian, but who differed in terms of their age and English language proficiency levels. Their responses led to the final selection of the images tested in this research, based on the following criteria: 1. The scope of the research was predominantly limited to prepositions *'na'* and *'u';* 2. Some of the items were chosen based on a) the potential differences in choosing the preposition as the images could be described with more than one abovementioned prepositions and/or because Croatian and English descriptions could yield a different choice of preposition; 3. Some of the items allowed for variations in the choice of the Landmark and potentially in the selection of the preposition itself (based on the Landmark). Most studies building on the BowPed series count a different choice of the Landmark as an invalid answer (Sahin, 2015), for the purpose of clear comparison between languages. I believe, however, that the choice of the Landmark could be left to the participants in order to understand which particular construal the images may impose. Finally, some of the images (5 in total) demonstrated relations not originally considered by Bowerman and Pederson, and were used as control items.

### 7.4.2. Methodology

A smaller part of the study was conducted in person, before the Covid-19 pandemic. Most of the answers, however, were collected via Zoom video calls with the participants. All of the conversations were recorded in their entirety, and the key information was also transcribed during the conversations. Each individual session lasted approximately 30-45 minutes.

The participants were given a form, in which they were required to provide some background information - their name, age, gender, years of studying English, and they also had to estimate their proficiency level, on a scale from *elementary,* followed by *good, very good* to *excellent.* The participants were then presented with all of the images in a randomized order, and had to complete three tasks in total, all in spoken form. The participants were first asked to locate the object in each image that the arrow was pointing at (e.g. *'The apple is in the bowl.').* The Trajector and the Landmark were not explicitly stated in the question itself because it was important to elicit the most natural response. This approach would provide the best insight into how static spatial relations present in the stimuli are *perceived* in the mind, as well as lexicalised. However, if the participants did not initially focus on the expected object, they were usually additionally asked to locate that object as well. They were asked to do this both in Croatian and in English. In the hopes of causing code-switching between the two languages, and thereby minimizing the effects of literal translation and L1 transfer, the participants were asked to use Croatian first for some items, whereas they were asked to provide the English description first for others. This was done in no particular order and differed among the participants. Finally, the third task was conducted only in Croatian and it consisted of participants answering an additional question about each of the items. The questions were formulated in such a way that they would also elicit a verb. Some of the most common questions were: *'How did this object (the Trajector) get there?'*; *'What did someone have to*

*do with the object in order for it to get there?*', etc. Alternatively, if the picture could instantly be perceived as dynamic, the questions were typically: *'What is (xy) doing?'* or *'Could you tell me what is going on in the picture?'* or *'How would you describe the scene to a person who cannot see it?'.* The participants were therefore encouraged to encode not only a spatial relation, but potentially Manner or Path of the motion event in order to explain how the Trajector reached its Goal. This third and final task, however, was intended for future research and was not analysed in detail for the purposes of the present study.

## 7.5. Results

### 7.5.1. Descriptions of static spatial relations in Croatian and in English

The first part of the data analysis focused on the frequencies of different prepositions chosen to describe a static spatial relation in the first and the second task, i.e. in Croatian and in English. Each preposition was coded as a separate answer, as the first stage of the analysis aimed to explore the encoding of different static spatial relations in terms of prepositions specifically. In the initial analysis, the specificity of the description was not taken into account (e.g. *'in'* vs *'in the middle of'*; *'on'* vs *'on the upper part of'*), and neither was the fact that some of the participants chose to describe some of the items with a combination of a verb and a preposition in the first task (mainly by using the passive voice followed by a prepositional phrase (e.g. *'mašna je zavezana za svijeću' – 'the bow is tied to a candle'*)). The latter occurrence was closely examined after the initial analysis.

When calculating the frequencies of chosen prepositions for the description of each item, some answers were treated as invalid, as they would interfere with the data analysis due to misinterpretation of the Trajector. For example, there were instances of a hole in the towel (item 6) viewed as a stain, which would, of course, limit the choice of preposition to *'na'* or *'on'* (as opposed to correctly viewing the Trajector as a hole, in which case both *'na'* (*'on'*) and *'u'* (*'in'*) are expected and acceptable). In some other cases, the participants had no issue in correctly identifying the objects in the images, but limited or broadened their focus. These types of invalid answers are exemplified by item 3 (showing a picture of a sailboat on the sea), whose descriptions sometimes focused solely on the sail on the boat itself, or by item 32 (a handle on a bag), which was described by some participants as showing a bag on the floor. However, if the participants reversed the role of the Trajector and the Landmark (e.g. item 9 – a picture of a shoe on someone's foot; item 25 – an apple on a stick), these answers were coded

separately, but treated as valid because they could provide valuable insights into how native speakers of Croatian choose between Landmarks and Trajectors in natural spoken language.

For easier data representation and analysis, the images were grouped not only in terms of the expected preposition, but also based on the types and specific features of spatial relations. The division of the items into subcategories was performed based on Bowerman and Pederson's (1992) in Brala-Vukanović, 2013, Šarić's (2008), Feist's (2010) and Zhang's (2013) observations.

The first subgroup contained those items that represent the spatial meaning of *'na'* (as well as *'on'*) that is frequently defined as prototypical. More specifically, these pictures showed the relation of 'support from below'. This set of images contained items 8 (a garden hose placed on a tree stump) and 16 (a tablecloth on a table).

A total of 28, or 90.3% of the participants described item 8 with *'na'* in Croatian. Only one answer was counted as invalid, whereas two participants located the hose *'oko' ('around')* the stump, probably due to the (folded) shape of the hose. English descriptions led to similar results – 87.1% of the participants used the preposition *'on',* 6.5% (2 participants) chose the preposition '*around'*, whereas one of the subjects provided a more specific description, using *'on top of'*.

There was more variation in English descriptions of item 16 (tablecloth on a table) when compared to its Croatian descriptions. Only one participant chose a preposition different than *'na'* when providing a Croatian description (*'nad stolom' – 'over the table'*), whereas the overwhelming majority (96.8%) used *'na'*. Even though variations in English descriptions included prepositions *'over'* (6.5%)*, 'around'* (3.2%) and *'on top of the table'* (3.2%)*,* a total of 87.1% of participants encoded the relation with the preposition *'on'*.

| Item 8 - Croatian | | |
|---|---|---|
| | Frequency | Percent |
| na | 28 | 90.3 |
| oko | 2 | 6.5 |
| invalid | 1 | 3.2 |
| Total | 31 | 100.0 |

| Item 8 - English | | |
|---|---|---|
| | Frequency | Percent |
| on | 27 | 87.1 |
| around | 2 | 6.5 |
| on top of | 1 | 3.2 |
| invalid | 1 | 3.2 |
| Total | 31 | 100.0 |

| Item 16 - Croatian | | |
|---|---|---|
| | Frequency | Percent |
| na stolu | 30 | 96.8 |
| nad stolom | 1 | 3.2 |
| Total | 31 | 100.0 |

| Item 16 - English | | |
|---|---|---|
| | Frequency | Percent |
| on | 27 | 87.1 |
| over | 2 | 6.5 |
| around | 1 | 3.2 |
| on top of | 1 | 3.2 |
| Total | 31 | 100.0 |

*Table 1 – Support from below*

Topological relations of adhesion (clingy attachment) were analysed next, as exemplified by items 1 (stamp on an envelope), 4 (butter on a knife), 17 (Band-aid on a leg) and 24 (rain on a window).

The first item, showing a stamp on an envelope, demonstrated the largest uniformity of answers – all of the participants described the relation with *'na'* in Croatian and *'in'* in English. Similarly, virtually all of the participants (96.8%) encoded the relation between the butter and the knife with the preposition *'na'* and *'on'*. The same percentage of the participants described

item 17 (a Band-aid on a leg) as being *'na nozi/gležnju'* and *'on someone's leg/ankle'*, with the exception of a single participant who located the Band-aid *'oko gležnja'* (*'around the ankle'*) in Croatian, and two participants (6.5%) who described it as being *'stuck to the leg'* in English.

Item 24 (raindrops on a window) resulted in the largest variety in answers in this category of topological relations, both in English and in Croatian descriptions, largely due to a dynamic interpretation of the picture. 80.6% of the participants described the image with the expected *'kiša je na prozoru'* (*'rain is on the window'*); one participant (3.2%) used an adverb, rather than a preposition (*'kiša pada vani' – 'the rain is falling outside'*); 9.7.% (3 participants) opted for the description *'kiša pada po prozoru',* which does not have an exact English equivalent and could be translated as *'The rain is falling on the window.*'; and there were two more prepositions used (each of them once, i.e. each occurred in 3.2% of the cases) – *'kiša udara u prozor' – 'the rain is banging against the window'* and *'kiša klizi niz prozor' – 'the rain is sliding down the window'.* When it comes to English descriptions, 80.6% participants described the rain as being *'on the window';* 2 participants (6.5%) used no preposition (*'the rain is hitting the window'*); and *'falling against', 'sliding down', 'in the middle of'* and *'at' w*ere each represented in 3.2% of the cases.

**Item 1 - Croatian**

| | Frequency | Percent |
|---|---|---|
| na | 31 | 100.0 |

**Item 1 - English**

| | Frequency | Percent |
|---|---|---|
| on | 31 | 100.0 |

**Item 4 - Croatian**

| | Frequency | Percent |
|---|---|---|
| na nožu | 30 | 96.8 |
| nvalid answer (misinterpretation) | 1 | 3.2 |
| Total | 31 | 100.0 |

**Item 4 - English**

| | Frequency | Percent |
|---|---|---|

| | | | |
|---|---|---|---|
| | on the knife | 30 | 96.8 |
| | invalid answer (misinterpretation) | 1 | 3.2 |
| | Total | 31 | 100.0 |
| **Item 17 - Croatian** | | | |
| | | Frequency | Percent |
| | na nozi/gležnju | 30 | 96.8 |
| | oko | 1 | 3.2 |
| | Total | 31 | 100.0 |
| **Item 17 - English** | | | |
| | | Frequency | Percent |
| | on the leg/ankle | 29 | 93.5 |
| | stuck to the leg | 2 | 6.5 |
| | Total | 31 | 100.0 |
| **Item 24 - Croatian** | | | |
| | | Frequency | Percent |
| | no preposition (vani) | 1 | 3.2 |
| | na | 25 | 80.6 |
| | (pada) po | 3 | 9.7 |
| | (udara) u | 1 | 3.2 |
| | (klize) niz | 1 | 3.2 |
| | Total | 31 | 100.0 |
| **Item 24 - English** | | | |
| | | Frequency | Percent |
| | no preposition (hitting the window) | 2 | 6.5 |
| | on | 25 | 80.6 |
| | (falling) against | 1 | 3.2 |
| | (sliding) down | 1 | 3.2 |
| | at | 1 | 3.2 |
| | in (the midlle of) | 1 | 3.2 |
| | Total | 31 | 100.0 |

*Table 2 – Clingy attachment*

Relations of fixed attachment were analysed next, comprising item 26 (hooks on a wall), a solid representative of the category, and 9 (shoe on a foot), which was considered

relatively fixed (even though, arguably, the person could remove it much easier than detach a hook from a wall). Both items, however, represent man-induced attachment.

The frequency of the preposition *'na'* was 83.9% for item 26 in Croatian. Other descriptions included prepositions *'u'* (*'in'*) – 2 participants, or 6.5%, located the hooks *'in the room'* (*'u sobi'*), and an equal number of subjects described them as being *'hooked to/onto the wall'* (*'zakačene za zid'*). There was also a single instance in which a participant used the preposition *'sa'* (*'from'*) as a result of viewing the hooks as *'hanging from the wall' ('vise sa zida')*. These descriptions were almost (albeit not completely) identically reflected in the English descriptions of the same item, in which 83.9% of the participants described the relation with *'on',* and the remaining percentages were split among *'in the room'* (6.5%), *'hanging from the wall'* (6.5%) and a single example of the relation being encoded with the preposition *'at'* (3.2%).

The vast majority of participants, i.e. 93.5% described item 9 with prepositions *'na'* in Croatian and *'on'* in English. The remaining two participants (6.5%) reversed the roles of the Landmark and the Trajector, stating that the leg was *'u cipeli'* in Croatian and *'in the shoe'* in English. This is the only item of this category with completely identical frequencies of prepositions both in Croatian and in English.

**Item 26 - Croatian**

| | | Frequency | Percent |
|---|---|---|---|
| | na zidu | 26 | 83.9 |
| | u sobi | 2 | 6.5 |
| | vise sa zida | 1 | 3.2 |
| | (zakačene) za zid | 2 | 6.5 |
| | Total | 31 | 100.0 |

**Item 26 - English**

| | | Frequency | Percent |
|---|---|---|---|
| | on the wall | 26 | 83.9 |
| | in the room | 2 | 6.5 |
| | (hanging) from | 2 | 6.5 |

| | | | |
|---|---|---|---|
| | at the wall | 1 | 3.2 |
| | Total | 31 | 100.0 |
| **Item 9 - Croatian** | | | |
| | | Frequency | Percent |
| | na nozi/stopalu | 29 | 93.5 |
| | noga je u cipeli | 2 | 6.5 |
| | Total | 31 | 100.0 |
| **Item 9 - English** | | | |
| | | Frequency | Percent |
| | on the leg/foot | 29 | 93.5 |
| | leg in the shoe | 2 | 6.5 |
| | Total | 31 | 100.0 |

*Table 3 – Fixed attachment*

The following items proved to be somewhat difficult to categorize, so I eventually grouped them according to Šarić's (2008) elaboration of *'na'*, i.e. according to her analysis of various degrees of attachment and possible detachment of the TR from the LM. The category consists of pictures 20 (flag on a flagpole), 21 (ladder leaned against a wall) and 27 (bugs on walls), which can be viewed as relations that fall somewhere between fixed and point-to-point attachment, but do not perfectly correspond to either. The reasoning was as follows: the flag is attached to the flagpole at two points of contact, but is arguably more easily removable from the LM than the TRs from the previous category (hooks on a wall), and represents attachment at two specific points. The same principle applies to a ladder leaned against a wall, which represents an even easier detachment (the wall does provide support and controls the location of the ladder, but the attachment is not fixed). Finally, bugs are animate objects, whose position (albeit supported by the wall) is entirely under their own control, and could therefore easily change.

87.1% described item 20 (a flag on a flagpole) as being *'na stupu/na vrhu stupa'* (*'on'* or *'on top of'*), whereas the usage of different prepositions (each in 3.2% of all answers) stemmed from the fact that the participants focused on the entire flag (together with the flagpole) and therefore chose the house as the Landmark (*'blizu'; 'u blizini'; 'ispred'* or *'pred'* – *'near'; 'nearby'; 'in front of'*). Interestingly, these interpretations are not entirely reflected in the English descriptions. 77.4% opted for *'on',* whereas *'near', 'in front of'* and *'is flying/hanging from the pole'* were found in 6.5% of the cases. One participant located the flag *'in the field',* essentially overlooking both the pole and the house as potential Landmarks. It is interesting to note that, even though these examples were found in a small number of cases, native speakers of Croatian use *'from'* when they perceive the situation as dynamic, even though such a description is unusual and would presumably not be a NS's natural description of the scene, nor is its Croatian equivalent (*'sa'*) found in their Croatian descriptions.

Item 21 (ladder against a wall) was intended for the research of the preposition *'na'* in Croatian, even though it occurs as one of the prototypical relations associated with *'against'* in Lindstromberg (2010, pp.183-184). There is no Croatian equivalent for *'against',* at least not in its literal, spatial sense (the most appropriate translation is arguably *'uz'*, but it does not frequently occur with copulative verbs in Croatian), so this item proved to be particularly interesting. In Croatian, the overwhelming majority (93.5%) described the relation with *'na'*. The only other two interpretations were encoded with prepositions *'pokraj'* (*'next to'*) and *'sa strane zida'* (*'on the side of the wall'*). In English, 58.1% of the participants used the preposition *'on'*, even though this would not be NSs' natural response, and this is probably a result of L1 transfer, i.e. literal translation. 29% of the participants described the image with *'against'*, whereas *'(leaned) onto', 'by', 'at' a*nd *'next to'* each occurred once.

Item 27 (bugs on walls) showed a high level of uniformity in answers – 90.3% of the participants encoded the relation with *'na'*. The remaining descriptions contained prepositions

*'po' ('kukci hodaju po zidu' – 'the bugs are walking along the walls')*, *'u'* (*'kukci su u sobi' – 'the bugs are in the room'*) and *'sa strane'* (*'kukci su sa svih strana lampe'*, which could roughly be translated as *'the bugs are all around the lamp'*), each of which was only found in 3.2% of answers. In other words, all of these prepositions occurred only once.

When it comes to its English description, 87.1% chose the preposition *'on',* and the remaining percentage was equally distributed among prepositions *'along'* (*'crawling along the walls'*), *'in' (the room), 'at'* and *'on all sides of the lamp',* which does technically fall into the category of *'on'*, but refers to a different Landmark and is a wrong translation of the Croatian expression mentioned earlier.

**Item 20 - Croatian**

| | Frequency | Percent |
|---|---|---|
| na stupu/vrhu stupa | 27 | 87.1 |
| blizu kuće | 1 | 3.2 |
| u blizini kuće | 1 | 3.2 |
| ispred kuće | 1 | 3.2 |
| pred kućom | 1 | 3.2 |
| Total | 31 | 100.0 |

**Item 20 - English**

| | Frequency | Percent |
|---|---|---|
| on the pole | 24 | 77.4 |
| near the house | 2 | 6.5 |
| in front of the house | 2 | 6.5 |
| in | 1 | 3.2 |
| (is hanging/flying) from the pole | 2 | 6.5 |
| Total | 31 | 100.0 |

**Item 21 - Croatian**

| | Frequency | Percent |
|---|---|---|
| naslonjene na zid/na zidu | 29 | 93.5 |
| pokraj | 1 | 3.2 |
| sa strane zida | 1 | 3.2 |
| Total | 31 | 100.0 |

**Item 21 - English**

| | Frequency | Percent |
|---|---|---|
| on | 18 | 58.1 |
| against | 9 | 29.0 |
| onto | 1 | 3.2 |
| next to | 1 | 3.2 |
| by | 1 | 3.2 |
| at | 1 | 3.2 |
| Total | 31 | 100.0 |

**Item 27 - Croatian**

| | Frequency | Percent |
|---|---|---|
| na zidu | 28 | 90.3 |
| (hodaju) po zidu | 1 | 3.2 |
| u sobi | 1 | 3.2 |
| sa svih strana lampe | 1 | 3.2 |
| Total | 31 | 100.0 |

**Item 27 - English**

| | Frequency | Percent |
|---|---|---|
| on the wall(s) | 27 | 87.1 |
| (crawling) along the walls | 1 | 3.2 |
| in the room | 1 | 3.2 |
| on the sides of the lamp | 1 | 3.2 |
| at | 1 | 3.2 |
| Total | 31 | 100.0 |

*Table 4 – Relatively fixed, but also point-to-point attachment*

The next subcategory of items represented relations of point-to-point attachment. This subgroup comprised items 7 (balloon on a stick); 14 (a clothespin on a clothesline); 19 (apples on a tree); 28 (clothes on a clothesline) and 32 (handle on a bag).

71% of the participants described the relation in picture 7 as *'balon je na štapu/zavezan na štap'* (*'the balloon is on/tied onto the stick'*) in Croatian. 16.1% (5 participants) highlighted the point of contact, describing the image with the expression *'balon je zavezan za štap'* (*'tied to the stick'*). Other answers included prepositions *'kraj/pokraj'* (*'next to'*) (6.5%) and *'ispod'* (*'under'*) (6.5%). These participants ignored the point of contact and focused instead only on

the position of the largest part of the surface of both objects. In English, fewer participants described the image with *'on'* (58.1%), followed by the preposition *'to'* (*'tied to the stick'*) (22.6%). The frequencies of the preposition *'around'* and *'next to'* were both 6.5%, and there were single instances of descriptions with *'under' a*nd *'behind'* (3.2% each). It is interesting that *'tied to'* was more commonly represented than its Croatian equivalent, as well as the fact that some participants decided to completely change the choice of preposition when asked to lexicalise the relation in English.

96.8% of the participants located the clothespin *'na'* (*'on'*) the clothesline, whereas only one participant (3.2%) described the image as *'štipaljka visi sa špage'* (*'the clothespin is hanging from the wire'*). In English, 90.3% used the preposition *'on',* whereas *'at', 'by' a*nd *'hanging from' w*ere each provided once (in 3.2% of the cases).

When describing item 19 (a picture of apples on a tree), 83.9% of participants used the preposition *'on'* (*'na'*), followed by 9.7% (3 participants in total) who used the preposition *'sa'* (*'from'*), i.e. the expression *'Jabuke vise sa stabla.'* (*'The apples are hanging from the tree.'*). The remaining two participants (6.5%) stated that the apples were *'u krošnji'* (*'in the crown of the tree'*). In English, fewer participants opted for the preposition *'on'* – 71% in total. 16.1% used the expression *'in the tree',* which means that the participants were aware of the fact that English allows for this interpretation of the image as well. In English, stating that something is *'in the tree'* signifies the presence of the object in the crown of the tree, whereas in Croatian, the speaker has to specify the part of the tree in order to be able to express such a relation (simply describing the relation with *'u stablu'* would be highly unusual in Croatian, and would probably express a different meaning, i.e. locate the object in the tree trunk). Therefore, when presented with an image of the entire apple tree, it is more natural and economical for speakers of Croatian to state that the apples are *'na'* (*'on'*) the tree. An equal number of participants

(9.7%) that described the image with *'vise sa'* in Croatian used its English equivalent (*'hanging from'*).

Item 28, showing clothes on a clothesline, was described with *'na'* in 80.6% of the cases. The remaining percentage was split among *'vani'* (*'outside'*) (6.5%); *'visi sa'* (*'is hanging from'*) (9.7%) and *'zakačena za'* (*'hooked on/onto'*) (3.2%). In English, 77.4% of the participants used the preposition *'on'*; 12.4% opted for *'are hanging from';* 6.5% chose *'outside'* and 3.2% (only one participant) used *'at'*.

The final item in this category (32) showed a handle on a bag, and it has shown the greatest variety in answers, as well as the largest percentage of invalid answers, due to the confusing nature of the image itself – the bag also contained a box inside it, and it was unclear to most of the participants what the arrow was pointing at. In Croatian, 64.5% described the handle as being *'na'* (*'on'*) the bag and 16.1% of the answers were counted as invalid because the participants focused either on the entire bag or on the box and tried to describe the position of the bag with reference to the box, which proved to be virtually impossible. Two participants (6.5%) did not use a preposition, but stated that the handle was *'dio torbe'* (*'a part of the bag'*). The remaining descriptions were *'zakačena za'* (*'hooked onto'*); *'ispred'* (*'in front of'*); *'viri iz'* (*'is sticking out from'*) and some used multiple prepositions in order to precisely locate the handle. Each of these descriptions was found only once (3.2%). Similarly, 61.3% of the participants described the relation with *'on'* in English, 6.5% said that the handle was *'a part of the bag'* and 6.5% described it as *'tied to the bag'. 'In front of', 'outwards'* and *'protruding from'* each occurred in 3.2% of the cases. The remaining 16.1% were treated as invalid.

**Item 7 - Croatian**

| | Frequency | Percent |
|---|---|---|
| na | 22 | 71.0 |
| zavezan za štap | 5 | 16.1 |
| (po)kraj štapa | 2 | 6.5 |
| ispod štapa | 2 | 6.5 |
| Total | 31 | 100.0 |

**Item 7 - English**

| | Frequency | Percent |
|---|---|---|
| on | 18 | 58.1 |
| tied to | 7 | 22.6 |
| (tied) around | 2 | 6.5 |
| next to | 2 | 6.5 |
| under | 1 | 3.2 |
| behind | 1 | 3.2 |
| Total | 31 | 100.0 |

**Item 14 - Croatian**

| | Frequency | Percent |
|---|---|---|
| na | 30 | 96.8 |
| visi sa | 1 | 3.2 |
| Total | 31 | 100.0 |

**Item 14 - English**

| | Frequency | Percent |
|---|---|---|
| on | 28 | 90.3 |
| hanging from | 1 | 3.2 |
| at | 1 | 3.2 |
| by | 1 | 3.2 |
| Total | 31 | 100.0 |

**Item 19 - Croatian**

| | Frequency | Percent |
|---|---|---|
| na drvetu | 26 | 83.9 |
| u krošnji | 2 | 6.5 |
| vise sa drveta | 3 | 9.7 |
| Total | 31 | 100.0 |

**Item 19 - English**

| | Frequency | Percent |
|---|---|---|
| on the tree | 22 | 71.0 |
| in the tree | 5 | 16.1 |
| hanging from | 3 | 9.7 |
| across | 1 | 3.2 |
| Total | 31 | 100.0 |

| Item 28 - Croatian | | | |
|---|---|---|---|
| | | Frequency | Percent |
| | no preposition (vani) | 2 | 6.5 |
| | na | 25 | 80.6 |
| | (visi) sa | 3 | 9.7 |
| | (zakačena) za | 1 | 3.2 |
| | Total | 31 | 100.0 |
| **Item 28 - English** | | | |
| | | Frequency | Percent |
| | no preposition (outside) | 2 | 6.5 |
| | on | 24 | 77.4 |
| | (hanging) from | 4 | 12.9 |
| | at | 1 | 3.2 |
| | Total | 31 | 100.0 |
| **Item 32 - Croatian** | | | |
| | | Frequency | Percent |
| | je dio torbe | 2 | 6.5 |
| | na torbi | 20 | 64.5 |
| | (zakačena) za | 1 | 3.2 |
| | ispred | 1 | 3.2 |
| | (viri) iz torbe | 1 | 3.2 |
| | multiple prep. | 1 | 3.2 |
| | invalid answer | 5 | 16.1 |
| | Total | 31 | 100.0 |
| **Item 32 - English** | | | |
| | | Frequency | Percent |
| | is a part of the bag | 2 | 6.5 |
| | on the bag | 19 | 61.3 |
| | (tied) to the bag | 2 | 6.5 |
| | in front of the bag | 1 | 3.2 |
| | (protruding) from | 1 | 3.2 |
| | outwards | 1 | 3.2 |
| | invalid answer | 5 | 16.1 |
| | Total | 31 | 100.0 |

*Table 5 – Point-to-point attachment*

Relations that are typically treated as neighbouring to point-to-point attachment are given the common name of 'encirclement with contact', represented in this study by items 2 (a bow on a candle), 15 (a hose around a stump) and 29 (corset around a woman's waist). Interestingly, not all of these relations were treated equally by the participants. 58.1% of subjects described picture 2 with *'na'*, followed by *'oko'* (*'around'*) (38.7%). In English, 61.3% of participants used the preposition *'on',* 32.3% opted for *'around'*, and one participant (3.2%) stated that the bow was *'tied to'* the candle.

*'Na'* was also the preferred preposition for item 29, partially due to the fact that the woman or the dress were commonly chosen as Landmarks. However, some participants opted for *'na'* even when they spoke about the waist itself. The remaining 41.9% expectedly used *'oko'* (*'around'*). In English, 48.1% stated that the corset was *'on'* the dress/woman/waist, followed by 45.2% who used *'around'.* One participant (3.2%) described the relation with *'at',* and one participant stated that the corset was *'in the middle of the body'*.

However, such results were not obtained for item 15, which the overwhelming majority of participants (93.5%) described with *'oko'* and only two participants (6.5%) with *'zamotano za panj'.* Even though these participants used a different preposition in Croatian (which most closely resembles the English preposition *'to'*), the preposition would probably not change when translated into English, due to the meaning of the verb (*'wrapped around* (not *to*) the *tree stump'*). In English, 96.8% of the participants encoded the relation with *'around'*, and only one participant with *'at'.* This is not surprising, due to the translation issue explained above. The data obtained for this particular category point to the fact that some other elements must be crucial for the difference between *'na'* and *'oko'*, either in terms of salient elements of the objects/spatial scene, or pertaining to common collocations found in the Croatian language. In other words, there must be a 'cut-off point' between these prepositions within the category of encirclement with contact.

| Item 2 - Croatian | | | |
|---|---|---|---|
| | | Frequency | Percent |
| | na svijeći | 18 | 58.1 |
| | oko svijeće | 12 | 38.7 |
| | invalid answer (misinterpretation) | 1 | 3.2 |
| | Total | 31 | 100.0 |

| Item 2 - English | | | |
|---|---|---|---|
| | | Frequency | Percent |
| Valid | on the candle | 19 | 61.3 |
| | around the candle | 10 | 32.3 |
| | tied to the candle | 1 | 3.2 |
| | invalid answer (misinterpretation) | 1 | 3.2 |
| | Total | 31 | 100.0 |

| Item 15 - Croatian | | | |
|---|---|---|---|
| | | Frequency | Percent |
| | oko panja | 29 | 93.5 |
| | (zamotano) za | 2 | 6.5 |
| | Total | 31 | 100.0 |

| Item 15 - English | | | |
|---|---|---|---|
| | | Frequency | Percent |
| | around the stump | 30 | 96.8 |
| | at the stump | 1 | 3.2 |
| | Total | 31 | 100.0 |

| Item 29 - Croatian | | | |
|---|---|---|---|
| | | Frequency | Percent |
| | oko | 13 | 41.9 |
| | na haljini/ženi/struku | 18 | 58.1 |
| | Total | 31 | 100.0 |

| Item 29 - English | | | |
|---|---|---|---|
| | | Frequency | Percent |
| | around the waist | 14 | 45.2 |
| | on the dress/woman/waist | 15 | 48.4 |
| | at the waist | 1 | 3.2 |
| | in (the middle of the body) | 1 | 3.2 |
| | Total | 31 | 100.0 |

*Table 6 – Encirclement with contact*

Items that represent TRs impaled/spitted on LMs were analysed next. This subcategory included items 10 (papers on a needle) and 25 (an apple on a stick). The first image showed a higher uniformity in answers – in Croatian, 93.5% of the participants used the preposition *'na'* to describe the relation, leaving only one participant who stated that the papers were *'probodeni šiljkom'* (*'pierced by the needle'*), which means that this person did not use any preposition, and one participant who said that the papers were *'zabodeni u'* (*'stuck in the needle'*). In English, 87.1% used the preposition *'on'*, and other answers included *'punctured by', 'drilled onto', 'attached to'* and *'embedded in'*. Each of these occurred only once, or in 3.2% of the cases.

Item 25 proved to be slightly more complicated. Roughly a half (51.6%) of the participants stated that the apple was *'na štapu'* (*'on the stick'*). 32.2% of the participants chose the stick as the Trajector, and described the image either as *'štap ide/prolazi kroz jabuku'* (*'the stick is going/passing through the apple'*) (16.1%) or *'štap je u jabuci'* (*'the stick is in the apple'*) (16.1%). Three participants (9.2%) did not use a preposition at all, but stated that the stick *'pierced the apple'* (*'štap je probio jabuku'*). Similarly, one participant said that the apple was *'pierced with a stick'* (*'jabuka je probušena sa štapom'*), thereby explaining what happened to the apple, rather than locating it in space. One participant chose a different LM, and provided a description with the preposition *'u'* (*'in'*) – *'jabuka je u zraku'* (*'the apple is in the air'*). English descriptions showed an even greater variety in answers. Preposition *'on'* occurred in 48.1% of cases, followed by *'through'* (*'the stick is going/passing through the apple')* (22.6%) and *'in' ('the stick is in the apple')* (12.9%). Two participants (6.5%) did not use a preposition, but opted for a description such as *'the stick is piercing/poking the apple'*. The remaining 9.6% was equally split among *'on top of', 'at'* and *'pierced by the stick'* (3.2% each).

The reversal of the TR and the LM is another interesting point to observe. Even though the arrow was pointing at the apple, we would naturally perceive the stick as the Trajector in this case. It is certainly more movable and viewed as a tool, whereas the apple would be the more 'stable' of the two.

**Item 10 - Croatian**

| | Frequency | Percent |
|---|---|---|
| probodeni su iglom (no preposition) | 1 | 3.2 |
| na igli/šiljku/štapiću | 29 | 93.5 |
| zabodeni u | 1 | 3.2 |
| Total | 31 | 100.0 |

**Item 10 - English**

| | Frequency | Percent |
|---|---|---|
| punctured by | 1 | 3.2 |
| on | 27 | 87.1 |
| (drilled) onto | 1 | 3.2 |
| attached to | 1 | 3.2 |
| embedded in | 1 | 3.2 |
| Total | 31 | 100.0 |

**Item 25 - Croatian**

| | Frequency | Percent |
|---|---|---|
| no preposition | 3 | 9.7 |
| na štapu | 16 | 51.6 |
| u zraku | 1 | 3.2 |
| (je probušena) sa štapom | 1 | 3.2 |
| (ide) kroz jabuku (štap) | 5 | 16.1 |
| u jabuci (štap) | 5 | 16.1 |
| Total | 31 | 100.0 |

**Item 25 - English**

| | Frequency | Percent |
|---|---|---|
| no preposition (the stick is piercing/poking the apple) | 2 | 6.5 |
| on | 15 | 48.4 |
| on top of the stick | 1 | 3.2 |
| at the stick | 1 | 3.2 |
| (is pierced) by a stick | 1 | 3.2 |
| (the stick) (is going) through the apple | 7 | 22.6 |

| | | | |
|---|---|---|---|
| | (the stick is) in the apple | 4 | 12.9 |
| | Total | 31 | 100.0 |

*Table 7 – Impaled/spitted on*

Relations in which the TR pierces through the LM are typically analysed as the next category. This group of relations comprised items 13 (arrow in an apple) and 30 (earring in an ear).

Item 13 was most commonly described with *'kroz'* (*'through'*) in Croatian, with an overall percentage of 51.6%. In these cases, the image was also described with a verb and the participants adjusted the cases accordingly (e.g. *'Strijela prolazi kroz jabuku' – 'The arrow is going through the apple'*). It seems that NSs of Croatian are prone to viewing this relation as dynamic rather than static. When seen as static, *'u'*(*'in'*) would be the expected answer, which occurred with a frequency of 25.8%. The remaining 22.6% of participants did not use a preposition, but lexicalised the relation with *'Strijela je probola jabuku'* (*'The arrow pierced the apple'*), focusing on what happened, rather than encoding the relation. This serves as further proof that the participants were more focused on the action and its result than on the spatial scene. In English, an even higher number of participants used the preposition *'through'* (61.3%), followed by *'in'* (32.3%). Only two participants (6.5%) opted for a description without a preposition (*'The arrow pieced the apple.'*).

Item 30, however, categorised by Feist (2010) as a similar scene, was quite different. Given the shape of the earring (a hoop), it could be argued that it *pierces through* the ear, but we could also view it as a hanging TR, that establishes contact with the LM at a specific point. The results indicate that this is precisely how NSs of Croatian interpret the scene.

77.4% of the subjects described the relation with *'na'* (*'on'*) and 12.9% with *'u'* (*'in*). Other answers consisted of *'visi sa uha'* (*'is hanging from the ear'*) (6.5%) and *'zakačena za uho'* (*'hooked onto the ear'*) (3.2%). In English, 67.7% opted for *'on'* and 22.6% for *'in'*, showing perhaps a slight preference to focus on the partial inclusion when describing the image in English. 6.5% stated that the earring was *'hanging from'* the ear, and 3.2% that the earring was *'pierced through'* the ear. Interestingly, *'to/onto'* (the equivalent of 'za') did not occur in the English descriptions, whereas *'through'* occurred only in an English description.

**Item 13 - Croatian**

| | Frequency | Percent |
|---|---|---|
| je probola jabuku | 7 | 22.6 |
| u jabuci | 8 | 25.8 |
| (prolazi) kroz | 16 | 51.6 |
| Total | 31 | 100.0 |

**Item 13 - English**

| | Frequency | Percent |
|---|---|---|
| pierced the apple | 2 | 6.5 |
| in the apple | 10 | 32.3 |
| (is going) through | 19 | 61.3 |
| Total | 31 | 100.0 |

**Item 30 - Croatian**

| | Frequency | Percent |
|---|---|---|
| na uhu | 24 | 77.4 |
| u uhu | 4 | 12.9 |
| (zakačena) za uho | 1 | 3.2 |
| (visi) sa uha | 2 | 6.5 |
| Total | 31 | 100.0 |

**Item 30 - English**

| | Frequency | Percent |
|---|---|---|
| on the ear | 21 | 67.7 |
| in the ear | 7 | 22.6 |
| (pierced) through | 1 | 3.2 |
| (hanging) from | 2 | 6.5 |
| Total | 31 | 100.0 |

*Table 8 – TR pierces through the LM*

A particularly interesting subcategory of relations is that of 'partial inclusion', exemplified by items 3 (a sailboat on the sea) and 22 (a cork on/in a bottle). When encoding these relations, some of the participants even verbalized their thoughts on whether they should describe these images with *'on'* or *'in'*, as both are true and acceptable.

Item 3 (a sailboat on the sea) was most commonly described with *'na'* in Croatian (54.8%), followed by *'u'* (*'in'*), which occurred in 29% of cases. 3.2% (one participant) did not use a preposition, but stated that the boat *'plovi morem',* which requires a preposition in English (*'the boat is sailing on the sea'*) and one participant stated that the boat *'plovi po moru'* (*'is sailing on/along the sea'*). The remaining answers were invalid due to the wrong choice of the Trajector. In English, there was less variety in answers, and the percentages were more evenly distributed among different prepositions. 48.4% located the boat *'in the sea'* and 38.7% *'on the sea'*, showing once again a tendency by NSs of Croatian to focus on partial inclusion instead of support when describing these relations in English. Only one participant used a preposition other than *'on'* or *'in'* (*'at'*), whereas the remaining answers were invalid.

There was also an almost even split between prepositions *'na'* and *'u'* when describing item 22 (a cork on/in a bottle), with a slight preference for *'na'* (54.8%). The remaining 45.2% of the participants used the preposition *'u'*. In English, *'in' w*as once again the preferred description (51.6%), followed by *'on'* (22.6%) and *'on top of'* (16.1%). It is important to note that this does not mean that the speakers did not use the equivalent of *'on top of the bottle'* in Croatian (*'na vrhu boce'*), but *'na vrhu'* is not treated as a separate preposition in Croatian, but as a prepositional phrase. Other prepositions that occurred in the English descriptions were *'inside', 'at'* and the use of multiple prepositions (each in only 3.2% of cases, i.e. only once).

| Item 3 - Croatian | | |
|---|---|---|
| | Frequency | Percent |
| plovi morem | 1 | 3.2 |
| na moru/valovima | 17 | 54.8 |
| u moru/valovima | 9 | 29.0 |
| (plovi) po moru | 1 | 3.2 |
| invalid answer (misinterpretation) | 3 | 9.7 |
| Total | 31 | 100.0 |

| Item 3 - English | | |
|---|---|---|
| | Frequency | Percent |
| on the sea | 12 | 38.7 |
| in the sea | 15 | 48.4 |
| at the sea | 1 | 3.2 |
| invalid answer (misinterpretation) | 3 | 9.7 |
| Total | 31 | 100.0 |

| Item 22 - Croatian | | |
|---|---|---|
| | Frequency | Percent |
| u boci | 14 | 45.2 |
| na boci | 17 | 54.8 |
| Total | 31 | 100.0 |

| Item 22 - English | | |
|---|---|---|
| | Frequency | Percent |
| in the bottle | 16 | 51.6 |
| on the bottle | 7 | 22.6 |
| on top of | 5 | 16.1 |
| inside the bottle | 1 | 3.2 |
| at | 1 | 3.2 |
| multiple prepositions | 1 | 3.2 |
| Total | 31 | 100.0 |

*Table 9 – Partial inclusion*

Another similar subcategory exemplified ruptures as Trajectors, seen on or in Landmarks, and is therefore closely related to the previous category. When describing item 6 (a hole in/on a towel), 67.7% of the participants located the hole *'na'* (*'on'*) the towel, whereas only 19.4% stated that the hole was *'u'* (*'in'*) the towel. One participant located the hole *'pri*

*sredini ručnika'* (*'towards the middle of the towel'*) and the remaining 9.7% of the answers were invalid. In English, 48.4% stated that the hole was *'on the towel'*, and 41.9% that it was *'in the towel'*. In accordance with the previous findings of the study, NSs of Croatian showed that they are more likely to use *'in'* to describe such relations in English than in Croatian.

Comparably, when describing item 11 (a crack on/in a mug), the majority of participants (83.9%) stated that the crack was *'na šalici'* (*'on the mug'*) and 12.9% did not use a preposition, but only a verb – *'Šalica ima pukotinu' / 'Šalica je napuknuta'* (*'The mug has a crack' / The mug is cracked'*). In English, 74.2% opted for *'on'*, 12.9% for *'in'*, and 9.7% did not use a preposition.

**Item 6 - Croatian**

| | Frequency | Percent |
|---|---|---|
| u ručniku | 6 | 19.4 |
| na ručniku | 21 | 67.7 |
| pri sredini krpe/ručnika | 1 | 3.2 |
| invalid answer | 3 | 9.7 |
| Total | 31 | 100.0 |

**Item 6 - English**

| | Frequency | Percent |
|---|---|---|
| (hole) in the towel | 13 | 41.9 |
| (hole) on the towel | 15 | 48.4 |
| invalid answer (misinterpretation) | 3 | 9.7 |
| Total | 31 | 100.0 |

**Item 11 - Croatian**

| | Frequency | Percent |
|---|---|---|
| ima pukotinu/je napuknuta | 4 | 12.9 |
| na šalici | 26 | 83.9 |
| invalid answer | 1 | 3.2 |
| Total | 31 | 100.0 |

**Item 11 - English**

| | Frequency | Percent |
|---|---|---|
| has a crack/is cracked | 3 | 9.7 |
| on the cup | 23 | 74.2 |

| | | | |
|---|---|---|---|
| | in the cup | 4 | 12.9 |
| | invalid answer | 1 | 3.2 |
| | Total | 31 | 100.0 |

*Table 10 –Ruptures on/in LMs*

Finally, some of the analysed items illustrate topological relations not originally considered by Bowerman and Pederson, and were used as control items. One of such pictures is item 18 (garden hose laid over a tree stump).

Surprisingly, only 48.4% participants used the preposition *'preko'*, whereas 32.3% chose the preposition *'na'* (*'on'*), focusing only on the middle part of the hose, supported by the tree stump. 9.7% tried to use multiple prepositions in order to describe the position of each part of the hose, and the remaining 9.7% focused only on the end of the hose, instead of locating the entire object. There was more variety in answers in the English descriptions of the image – 41.9% of the participants chose *'over'*, followed by 29% who used *'on'*. An equal number of descriptions contained multiple prepositions when compared to Croatian (9.7%). *'On top of', 'across'* and *'through'* each occurred once (in 3.2.% of cases) and the remaining answers were treated as invalid.

| Item 18 - Croatian | | | |
|---|---|---|---|
| | | Frequency | Percent |
| | preko panja | 15 | 48.4 |
| | na panju | 10 | 32.3 |
| | multiple prepositions | 3 | 9.7 |
| | invalid answer | 3 | 9.7 |
| | Total | 31 | 100.0 |
| **Item 18 - English** | | | |
| | | Frequency | Percent |
| | over | 13 | 41.9 |
| | on | 9 | 29.0 |
| | on top of | 1 | 3.2 |
| | across | 1 | 3.2 |

| | | | |
|---|---|---|---|
| | through | 1 | 3.2 |
| | multiple prepositions | 3 | 9.7 |
| | invalid answer | 3 | 9.7 |
| | Total | 31 | 100.0 |

*Table 11 – Partial support ('over')*

Items that demonstrated no contact between the TR and the LM were placed into the final group, as they do not conform to the on-in continuum in any way. They would probably fall somewhere at the very beginning of the spectrum (TR higher than the LM with no contact) or at the very end (TR *inside*, or rather, surrounded by the LM, but with no contact (or vice versa)). This category contained items 5 (lamp above a table); 12 (cloud above a mountain); 31 (fence around a house) and 23 (house inside the fence). They were included in the study mainly because they allow the participants to describe the relations with multiple prepositions, depending on what they choose as the LM.

64.5% of participants described item 5 with the preposition *'iznad'* (*'above'*) in Croatian, followed by 12.9% who chose the ceiling as the Landmark, and therefore encoded the relation with *'na'* (*'on'*). 9.7% focused on the same Landmark, but stated the lamp *'visi sa stropa'* (*'is hanging from the ceiling'*). Two participants (6.5%) used multiple prepositions (both *'iznad'* and *'na'*), whereas *'nad stolom'* (*'over the table'*) and *'u zraku'* (*'in the air'*) each occurred once. English descriptions were quite similar, with a slightly larger variety in answers – 61.3% chose *'above'*, 12.9% used *'on'*, 9.7% the expression *'is hanging from'*, and there were single instances of prepositions *'in (the air)', 'over'* and *'upside (of the table)'*. One participant described the scene with multiple prepositions, and one stated that the lamp was *'higher than'* the table. Both *'upside'* and *'higher than'* can be treated as errors made by NNSs of English, since *'upside'* cannot function in such a construction (*'The lamp is upside the*

*table'*), and *'higher than'* denotes a different meaning (It does not refer to the position, but rather to the dimensions of the objects).

Item 12 (a cloud above a mountain) was most commonly described with *'iznad'* (*'above'*), which occurred in 83.9% of the answers. Only 9.7% of participants described the relation with *'na (nebu)'* (*'on',* which would, in this particular case, translate as *'in (the sky)'*), 3.2% (one participant) stated that the cloud was *'u zraku'* (*'in the air'*), and one participant used multiple prepositions. When it comes to the English descriptions, *'above'* occurred with a frequency of 23 (74.2%), followed by *'in (the sky/air)'* with an overall percentage of 12.9%. Two participants (6.5%) used the preposition *'on'* (one as a part of the expression *'hovering on a mountain'*, and the other as a literal translation of *'na nebu'* – *'on the sky'*). Finally, there were single instances of descriptions that contained *'over'* and *'on top of'*.

**Item 5 - Croatian**

| | Frequency | Percent |
|---|---|---|
| iznad stola | 20 | 64.5 |
| na stropu | 4 | 12.9 |
| visi sa stropa | 3 | 9.7 |
| u zraku | 1 | 3.2 |
| nad stolom | 1 | 3.2 |
| multiple prepositions | 2 | 6.5 |
| Total | 31 | 100.0 |

**Item 5 - English**

| | Frequency | Percent |
|---|---|---|
| above the table | 19 | 61.3 |
| on the ceiling | 4 | 12.9 |
| is hanging from the ceiling | 3 | 9.7 |
| in the air | 1 | 3.2 |
| over the table | 1 | 3.2 |
| multiple prepositions | 1 | 3.2 |
| is higher than the table | 1 | 3.2 |
| upside of the table | 1 | 3.2 |
| Total | 31 | 100.0 |

**Item 12 - Croatian**

| | | Frequency | Percent |
|---|---|---|---|
| | iznad planine | 26 | 83.9 |
| | na nebu | 3 | 9.7 |
| | u zraku | 1 | 3.2 |
| | multiple prepositions (na nebu iznad planine) | 1 | 3.2 |
| | Total | 31 | 100.0 |

**Item 12 - English**

| | | Frequency | Percent |
|---|---|---|---|
| | above the mountain | 23 | 74.2 |
| | in the sky/air | 4 | 12.9 |
| | over the mountain | 1 | 3.2 |
| | on top of the mountain | 1 | 3.2 |
| | on the sky + hovering on the mountain | 1 | 3.2 |
| | multiple prepositions | 1 | 3.2 |
| | Total | 31 | 100.0 |

*Table 12 – Higher than, no contact*

When describing item 31 (a fence around a house), 80.6% of participants used the expected preposition (*'oko' – 'around'*). Two participants (6.5%) did not include a preposition in their descriptions, stating that the fence *'ograđuje prostor/imanje'* (*'is surrounding the area/property'*). The remaining answers comprised of prepositions *'pored'* (*'next to'*), *'ispred'* (*'in front of'*), *'izvan (kuće)'* (*'outside (the house)'*) and *'na (farmi)'* (*'on (the farm)'*), each of which occurred only once.

The lexicalisation of this relation in English resulted in an almost identical overlap – 77.4% used *'around',* 9.7% did not use a preposition, and *'beside', 'in front of', 'outside'* and *'on (the farm)'* each occurred once, i.e. in 3.2% of cases.

Item 23 (a house inside a fence) was most commonly lexicalised as *kuća je u dvorištu/polju'* (*'the house is in the yard/field*'), but it is important to note that some of the participants tried to be more specific and described the house as being located *'u sredini*

*dvorišta/polja'* (*'in the middle of the yard/field'*). As previously explained, these descriptions are not treated as a separate case of the use of a preposition in Croatian, but rather as a preposition *'u'* followed by a prepositional phrase. When combined, descriptions with *'u'* occurred in 48.4% of cases. 12.9% chose the preposition *'unutar'* (*'inside'*) and an equal number of participants used *'na zemlji'* (*'on the ground'*). Two participants (6.5%) did not include a preposition in their description, but stated that the house was *'ograđena ogradom'* (*'surrounded by a fence'*). Other descriptions included prepositions *'iza'* (*'behind'*) (3.2%) and *'oko'* (*'around'*) (3.2%). The latter was the result of the participant choosing the fence as the Trajector. The remaining 12.9% of the answers were invalid, as the speakers focused only on the roof of the house. In English, 45.2% of the participants stated that the house was *'in'* or *'in the middle'* of the yard, followed by 19.4% who used *'inside'*. 12.9% encoded the relations with *'(surrounded) by'*, 6.5% with *'on (a piece of land)'* and one participant with *'behind'*.

**Item 31 - Croatian**

| | Frequency | Percent |
|---|---|---|
| no preposition (ograđuje imanje/prostor) | 2 | 6.5 |
| oko kuće/dvorišta | 25 | 80.6 |
| pored kuće | 1 | 3.2 |
| ispred kuće | 1 | 3.2 |
| izvan kuće | 1 | 3.2 |
| na farmi | 1 | 3.2 |
| Total | 31 | 100.0 |

**Item 31 - English**

| | Frequency | Percent |
|---|---|---|
| no preposition (is surrounding the house) | 3 | 9.7 |
| around the house | 24 | 77.4 |
| beside the house | 1 | 3.2 |
| in front of the house | 1 | 3.2 |
| outside the house | 1 | 3.2 |
| on the farm | 1 | 3.2 |
| Total | 31 | 100.0 |

**Item 23 - Croatian**

| | | Frequency | Percent |
|---|---|---|---|
| | no preposition (ograđena ogradom) | 2 | 6.5 |
| | na zemlji | 4 | 12.9 |
| | u dvorištu/u sredini | 15 | 48.4 |
| | unutar ograde | 4 | 12.9 |
| | iza ograde | 1 | 3.2 |
| | oko kuće je ograda | 1 | 3.2 |
| | invalid answer (misinterpretation) | 4 | 12.9 |
| | Total | 31 | 100.0 |

**Item 23 - English**

| | | Frequency | Percent |
|---|---|---|---|
| | surrounded by a fence | 4 | 12.9 |
| | on a piece of land | 2 | 6.5 |
| | in (the middle of) the yard | 14 | 45.2 |
| | inside the fence | 6 | 19.4 |
| | behind the fence | 1 | 3.2 |
| | invalid answer (misinterpretation) | 4 | 12.9 |
| | Total | 31 | 100.0 |

*Table 13 – Encirclement with no contact*

### 7.5.2. Different elements used to encode topological relations in Croatian

In order to correctly interpret the data, it was important to take a closer look at the answers, as the participants' descriptions sometimes contained a verb followed by a DO (with or without a preposition). These descriptions provide valuable insights into how NSs of Croatian distribute spatial information across the phrase. The differences could therefore not only account for the choice of a specific preposition, but also allow for a more precise analysis of Croatian locative expressions in general. In order to reach this goal, I have decided to calculate how many of the participants chose to encode each relation with a verb. Verbs *'biti'* (*'to be'*), *'nalaziti se'* (similar to 'existential there' in English) were not taken into account.

Overall, there were only six items that were encoded exclusively with a copulative verb and a prepositional phrase – items 4 (butter on a knife), 9 (shoe on a foot), 12 (cloud above a mountain), 16 (tablecloth on a table), 22 (cork in a bottle) and 29 (corset around a woman's waist). The descriptions of the remaining 27 items included at least one occurrence of a different verb. However, the relations in 13 more items were encoded with a verb with a percentage of only up to 10%. This means that over a half of the items tested in the study were described with a verb other than *'biti'* by only 0-3 participants (0-10.7%).

The results have revealed that the image that was most commonly described with a verb was item 13, showing an arrow in an apple. 74.2% of the participants chose to encode the position of the arrow with expressions such as *'strijela prolazi/je prošla kroz jabuku'* (*'the arrow is passing/passed through the apple'*) in 35.5% of cases. Other common answers consisted of the verbs *'ići kroz'* (*'to go through'*) and *'probadati'* (*'to pierce'*) (12.9% each). As we can see, the descriptions provided by the participants not only contained verbs, but were largely dynamic, and often required a preposition different than *'u'* (*'in'*), mainly *'kroz'* (*'through'*). 61.3% of subjects lexicalised the static spatial relation with a verb and a

preposition when describing item 21 (ladder against a wall), mainly opting for *'naslonjene na'* (*'leaned against'* (lit. *'on/onto'*)) (54.8%). Those were the only two items where such encoding of the relation occurred in over half of the answers. Items 15 (a hose wrapped around a stump) and 25 (an apple on a stick) came next, whose descriptions contained a verb in over 40% of cases (45.2% and 41.9% respectively). 25.8% participants stated that the hose was *'omotano oko panja'* (*'wrapped around the stump'*) when talking about item 15, whereas the descriptions of item 25 were more varied. This image was closely followed by item 18 (a hose over a stump), whose initial descriptions contained a verb and a preposition in 39.3% of cases, predominantly *'položeno', 'polegnuto'* (*'laid'*) or *'prebačeno'* ('t*ossed'*) in combination with the preposition *'preko'* (*'over'*) (10.7%).

Only three more items demonstrated a frequency of around 30% - 28 (clothes on a clothesline) (35.5%); 24 (raindrops on a window) (32.3%) and 10 (papers on a needle) (29%). The most common description of the image shown in item 28 was *'odjeća visi na štriku'* (*'the clothes are hanging on the clothesline'*), which was used in 12.9% of cases. Item 24 showed an even higher variety in answers, the most frequent of which was *'kiša pada po prozoru'* (*'the rain is falling on the window'*). 12.9% of the participants lexicalised the relation in item 10 with *'nabodeni na iglu'* (*'stuck onto a needle'*), and 9.7% of them with *'nabijeni na iglu'*, whose English translation would remain the same.

Items 2 (a bow on a candle) (26.7%), 7 (balloon on a stick) (22.6%) and 20 (a flag on a flagpole) (25.8%) came next, whereas the descriptions of all the remaining items consisted of the analysed structures in less than 20% of cases.

The relation between the TR and the LM in item 2 was lexicalised with *'zavezana oko'* (*'tied around'*) by 23.3% of the participants, which was also the most commonly occurring verb in the descriptions of item 7, but in combination with a different preposition – 16.1% of

participants stated that the balloon was *'zavezan za štap'* (*'tied to the stick'*). Finally, 19.4% used the verb *'vijoriti (se)'* in their initial descriptions of item 20.

A more detailed data overview can be seen in the table below.

| **Item** | **PP (overall)** | **Verb + PP (overall)** | **Specific verbs and percentages** |
|---|---|---|---|
| **1 (stamp on an envelope)** | 96.8% | 3.2% | zalijepljena na – 3.2% |
| **2 (bow on a candle)** | 73.3% | 26.7% | zavezana oko – 23.3% |
| | | | zamotana oko – 3.3% |
| **3 (boat on the sea)** | 89.3% | 10.7% | plovi morem/valovima – 7.1% |
| | | | plovi po moru – 3.6% |
| **4 (butter on a knife)** | 100% | / | / |
| **5 (82na n82bove a table)** | 87.1% | 12.9% | visi sa stropa – 9.7% |
| | | | visi iznad stola – 3.2% |
| **6 (hole in a towel)** | 96.6% | 3.4% | krpa ima rupu – 3.4% |
| **7 (balloon on a stick)** | 77.4% | 22.6% | zavezan za – 16.1% |
| | | | zavezan na – 6.5% |
| **8 (hose on a stump)** | 96.7% | 3.3% | obavijeno oko debla – 3.3% |
| **9 (shoe on someone's foot)** | 100% | / | / |
| **10 (papers on a needle)** | 71% | 29% | nabodeni na – 12.9% |
| | | | nabijeni na – 9.7% |
| | | | zabodeni u – 3.2% |
| | | | probodeni čačkalicom – 3.2% |
| **11 (crack in a mug)** | 86.7% | 13.3% | ima pukotinu – 6.7% |
| | | | je napuknuta – 6.7% |
| **12 (cloud above a mountain)** | 100% | / | / |
| **13 (arrow 82na n apple)** | 25.8% | 74.2% | prolazi kroz/je prošla kroz – 35.5% |
| | | | ide kroz – 12.9% |

| | | | |
|---|---|---|---|
| | | | probada/je probola jabuku – 12.9% |
| | | | je probila jabuku – 9.7% |
| | | | probijena je kroz – 3.2% |
| **14 (clothespin on a wire)** | 93.5% | 6.5% | visi sa – 3.2% |
| | | | je zavezana na – 3.2% |
| **15 (hose wrapped around a stump)** | 54.8% | 45.2% | omotano oko – 25.8% |
| | | | zamotano oko – 12.9% |
| | | | namotano oko – 3.2% |
| | | | zavezano oko – 3.2% |
| | | | zamotano za – 3.2% |
| | | | pričvršćeno za – 3.2% |
| **16 (tablecloth on a table)** | 100% | / | / |
| **17 (Band-aid on a leg)** | 96.8% | 3.2% | nalijepljen na – 3.2% |
| **18 (hose over a stump)** | 60.8% | 39.3% | položeno/polegnuto preko – 10.7% |
| | | | prebačeno preko – 7.2% |
| | | | ide preko – 7.2% |
| | | | prolazi preko – 3.6% |
| | | | ispruženo preko – 3,6% |
| | | | namotano na – 3.6% |
| | | | leži na – 3.6% |
| **19 (apples on a tree)** | 83.9% | 16.1% | vise sa – 9.7% |
| | | | rastu sa – 3.2% |
| | | | rastu na – 3.2% |
| **20 (flag on a pole)** | 74.2% | 25.8% | (se) vijori na – 19.4% |
| | | | lebdi na – 3.2% |
| | | | je podignuta na – 3,2% |
| **21 (ladder leaned against a wall)** | 38.7% | 61.3% | naslonjene na – 54.8% |
| | | | nagnute na – 3.2% |
| | | | oslonjene na – 3.2% |

| | | | |
|---|---|---|---|
| **22 (cork on/in a bottle)** | 100% | / | / |
| **23 (house inside a fence)** | 92.6% | 7.4% | je ograđena ogradom – 7.4% |
| **24 (raindrops on a window)** | 67.7% | 32.3% | pada po prozoru – 9.7% |
| | | | pada na prozor – 6.5% |
| | | | pada kroz prozor – 3.2% |
| | | | pada vani – 3.2% |
| | | | klize niz prozor – 3.2% |
| | | | udara u prozor – 3.2% |
| | | | nakupila se na prozoru – 3.2% |
| **25 (apple on a stick)** | 58.1% | 41.9% | štap prolazi kroz jabuku – 9.7% |
| | | | je nabodena na – 9.7% |
| | | | je probodena iglom – 6.5% |
| | | | je probušena s iglom – 3.2% |
| | | | štap bode jabuku – 3.2% |
| | | | štap je proboden kroz jabuku – 3.2% |
| | | | štap ide kroz jabuku – 3.2% |
| | | | jabuka je obavila iglu – 3.2% |
| **26 (hooks on a wall)** | 90.3% | 9.6% | zakačene za zid – 3.2% |
| | | | zalijepljene za zid – 3.2% |
| | | | vise sa zida – 3.2% |
| **27 (bugs on walls)** | 96.8% | 3.2% | hodaju po zidu – 3.2% |
| **28 (clothes on a clothesline)** | 64.5% | 35.5% | visi na – 12.9% |
| | | | suši se na – 6.5% |
| | | | suši se vani – 6.5% |
| | | | suši se sa – 3.2% |
| | | | visi sa – 3.2% |
| | | | zakačena je na – 3.2% |
| **29 (corset around a woman's waist)** | 100% | / | / |
| **30 (earing on an ear)** | 90.3% | 9.7% | visi sa uha – 6.5% |

| | | | |
|---|---|---|---|
| | | | zakačena je za uho – 3.2% |
| **31 (fence around a house)** | 90.3% | 9.7% | okružuje kuću/područje – 6.5% |
| | | | ograđuje kuću – 3.2% |
| **32 (handle on a bag)** | 92.3% | 7.7% | zakačena za – 3.8% |
| | | | viri iz – 3.8% |

*Table 14 – Verb percentages and examples*

The presence of a verb in a description, however, does not imply a dynamic interpretation of the scene in itself. This is why all of the descriptions containing a verb required further analysis, in terms of the voice (active vs passive), as well as the type of each active verb. There was only one picture predominantly interpreted as dynamic – item 13, whose descriptions including a verb (74.2% in total) were all also dynamic. A closer look at the types of verbs used to encode the relations in items 24 (raindrops on a window) and 28 (clothes on a clothesline) led to the conclusion that item 24 was more commonly perceived as dynamic, despite similar percentages of active verbs used for both pictures (around 30%). Item 24 was typically encoded with motion verbs such as *'kliziti'* (*'to slide'*) and *'padati'* (*'to fall'*), whereas active verbs used to encode item 28 were mostly *'sušiti se'* (*'to dry'*) and *'visjeti'* (*'to hang'*). As we can see, the semantics of these two verbs does not imply motion, and it would therefore be wrong to argue that the picture was viewed as dynamic. Item 20 (a flag on a flagpole) came next, as 22.6% of the descriptions containing a verb were also dynamic. It seems that the shape of the flag imposed a construal related to the environment (i.e. weather conditions), which resulted in descriptions containing verbs *'lebdjeti'* (lit. *'to float'*) and *'vijoriti (se)'* (*'to fly'*), which in Croatian, implies a flutter-like movement caused by the wind. Item 25 (apple on a stick) was interpreted as dynamic by 19.3% of participants, but mostly in those cases in which the stick was chosen as the TR.

Finally, in order to explore one of the previously described peculiarities of some Slavic languages, special attention was given to prefixed verbs followed by a PP in which the prefix is a cognate of the preposition. These patterns were found in the descriptions of 10 items in total (7, 10, 15, 17, 18, 21, 24, 26, 30 and 32). However, they were observed in just 3-10% of all answers for 6 of these 10 items, meaning that only 1-3 participants used such an expression when describing 6 of the items listed above.

What follows is the analysis of the remaining 4 items. The item demonstrating the highest percentage of such answers was item 21 (ladder leaned against a wall) (57% of all descriptions). The relation was most commonly encoded with *'naslonjene na'* (54.8%), whereas one participant opted for *'nagnute na'*. The English equivalent of both of these expressions is precisely *'leaned against/onto'*. In this particular case, the subjects likely assumed that encoding the relation only with a preposition would result in an incomplete description, as it would fail to encode the position, i.e. the type of contact established between the ladder and the wall. The combination of one of these verbs and the preposition *'na'*, on the other hand, imposes a more particular construal, which corresponds to English prepositions *'against'* or *'onto'*. 22.6% of subjects encoded the relation in item 10 (papers on a needle) with similar expressions, probably due to similar reasons. 12.9% opted for *'nabodeni na'* (*'stabbed onto'*), and 9.7% for *'nabijeni na'*. Using such a verb followed by the preposition *'na'*, again, imposes a particular construal – together with the NP (the LM), it tells us something not only about the position of the papers, but also implies that they are a) stacked on top of each other; b) impaled with a sharp object, passing through the papers; and, possibly, c) that they are positioned vertically, but on a horizontal object (a needle/spike, which is how the LM was typically identified).

Item 15 (a hose around a stump) was described with similar linguistic structures by 29% of the participants. 25.8% stated that the hose was *'omotano oko'* (*'wrapped around'*), whereas

one participant used *'zamotano za'* (the translation would probably remain the same, due to the meaning of the verb: *'omotati'* and *'zamotati'* are considered synonyms).

Finally, 16.1% of all subjects described item 7 (balloon on a stick) with the phrase *'zavezan za'* (*'tied to'*), thereby emphasizing the point and the type of contact established between the TR and the LM.

### 7.5.3. Result comparison between the two groups

After taking into consideration the Croatian and English descriptions of static spatial relations, an additional analysis was conducted in order to establish whether there were notable differences between the two groups in the encoding of spatial relations. Since the participants were divided into groups based on their proficiency levels, it was reasonable to assume that it would be easier for the first group to code-switch and to provide English descriptions that would be more native-like. Since Croatian and English spatial schemas largely overlap for most of the tested items, it was unnecessary to compare all the descriptions provided by the participants. Cross-tabulation analysis therefore included items 19, 21 (relations of joining and attachment, one containing a spatial preposition with no Croatian equivalent (*'against'*)); 30 (TR 'piercing through' the LM in English); 3, 22 (partial inclusion); 6 and 11 (ruptures in LMs).

Intra-, as well as inter-linguistic differences were observed in the encoding of relations of joining and attachment. Item 19 (apples on a tree) was lexicalised with *'na'* by 92.9% of the participants in the first group (C1-C2 level of proficiency), leaving only one participant (7.1%) who chose *'u'* and specified that the apples were *'u krošnji' ('in the crown of the tree').* In the second group (A2-B1 level of proficiency), the percentages were split between *'na'* (82.4%) and *'(vise)sa' ('(hanging) from')* (17.6%), whereas the preposition *'u'* did not occur at all. More differences were found when it comes to its English description. 64.3% of the participants

in the first group used the preposition *'on',* 28.6% opted for *'in',* and one participant chose *'across'.* In the second group, there was a perfect overlap of Croatian and English descriptions – 82.4% used *'on',* and 17.6% used *'from'*. These results seem to suggest that the first group demonstrated a higher awareness of how this relation could be encoded in English, but the scene was apparently problematic even for highly proficient speakers of English. As Zhang (2013) notes, NNSs of English demonstrate difficulties in appropriately encoding such relations with *'in'* not only because of the differences in conceptualisation, but also because they are less frequent in L2 input. The initial 92.9% of answers containing *'na'* in Croatian was reduced to 64.3% containing *'on'* in English, whereas the frequency of *'in'* increased by roughly 20% when compared to *'u'.* Even though, due to a small sample size, we cannot speak of significant differences, we can still note that the second group displayed the tendency to use identical descriptions in both languages.

We would, perhaps, expect to find more differences between the groups in their encoding of item 21 (ladder against a wall), as it exemplifies a preposition with no Croatian equivalent. The data, however, suggests otherwise. The prepositions used by the first group in the Croatian descriptions of the scene were *'na'* (92.9%) and '*pokraj'* (*'next to'*) (7.1%). The participants in the second group also mostly opted for *'na'* (94.1%), leaving 6.9% who chose *'sa strane'* (*'on the side (of)'*). In other words, there was only one participant in each group who did not use *'na'.* The relation was lexicalised with a wider variety of prepositions in English. More specifically, the first group used a total of 5 different prepositions – *'on'* (50%), *'against'* (28.6%), *'onto', 'next to'* and *'by'* (7.1% each). The second group used *'on'* more frequently when compared to the first group (64.7%), followed by *'against'* (29.4%) and *'at'* (5.9%). If we were to focus on the usage of *'against'* exclusively, the level of proficiency would prove to be insignificant - in fact, the less proficient group would demonstrate a higher percentage of native-like descriptions. Alternatively, if we were to argue that *'onto'* is also

closer to the English schema of conceptualisation, we would be looking at an overall percentage of 35.6% native-like descriptions in the first group, and 29.4% in the second. Finally, we could also compare the data based on the occurrence of *'on'*. Since there was no control group, we can only speculate about how NSs of English would choose to encode the relation. However, the usage of *'on'* would presumably require more contact between the TR and the LM (e.g. ladder hanging on a wall), so it would be reasonable to assume that *'on'* would not be used frequently by NSs. In this case, the usage of *'on'* could be treated as an error, and we could conclude that the more proficient group made fewer errors when lexicalising the relation in English (even though we observe a large percentage of errors in both groups).

**Item 19 - Croatian**

| Group | | N | % |
|---|---|---|---|
| C1-C2 | na | 13 | 92.9% |
| | u | 1 | 7.1% |
| A2-B1 | na | 14 | 82.4% |
| | (vise) sa | 3 | 17.6% |

**Item 19 - English**

| Group | | N | % |
|---|---|---|---|
| C1-C2 | on | 9 | 64.3% |
| | in | 4 | 28.6% |
| | across | 1 | 7.1% |
| A2-B1 | on | 14 | 82.4% |
| | from | 3 | 17.6% |

**Item 21 - Croatian**

| Group | | N | % |
|---|---|---|---|
| C1-C2 | na | 13 | 92.9% |
| | pokraj | 1 | 7.1% |
| A2-B1 | na | 16 | 94.1% |
| | sa strane | 1 | 5.9% |

**Item 21 - English**

| Group | | N | % |
|---|---|---|---|
| C1-C2 | on | 7 | 50.0% |
| | against | 4 | 28.6% |
| | onto | 1 | 7.1% |
| | next to | 1 | 7.1% |
| | by | 1 | 7.1% |

| | | | |
|---|---|---|---|
| A2-B1 | on | 11 | 64.7% |
| | against | 5 | 29.4% |
| | at | 1 | 5.9% |

*Table 15 – Relations of joining and attachment (group comparison)*

The participants' descriptions of item 30 (earring in an ear) ('point-to-point attachment in Croatian, and 'piercing through' relation in English) were also more closely examined. Since the data presented in this study showed that this picture falls under the category of 'point-to-point attachment' (i.e. shows a hanging TR), and Feist (2010) places it closer to *'in'* on the English continuum, it was estimated that it would be a good means of comparison. The first group was less likely to encode the relation with *'na'* in Croatian, which occurred in 64.3% of their answers. In the second group, *'na'* was found in 82.4% of descriptions. The analysis of the English descriptions is even more insightful: firstly, it is worth noting that *'in'* was used by only one participant in the second group, whereas we observe an even split between *'on'* and *'in'* in the first group (42.9% each). Secondly, the data points to the tendency of the participants in the first group to focus on the 'piercing' nature of the TR when they are asked to lexicalise the relation in English. When we compare the frequency of *'u'* in Croatian (21.4%) to *'in'* in English, we can see that the percentage has doubled. The first group was generally less likely to lexicalise the relation in the same way in Croatian and in English, whereas in the second group, the descriptions in L1 and L2 largely overlapped.

**Item 30 - Croatian**

| Group | | N | % |
|---|---|---|---|
| C1-C2 | na | 9 | 64.3% |
| | u | 3 | 21.4% |
| | (zakačena) za | 1 | 7.1% |
| | (visi) sa | 1 | 7.1% |
| A2-B1 | na | 14 | 82.4% |
| | u | 2 | 11.8% |
| | (visi) sa | 1 | 5.9% |

**Item 30 – English**

| Group | | N | % |
|---|---|---|---|
| C1-C2 | on | 6 | 42.9% |
| | in | 6 | 42.9% |
| | through | 1 | 7.1% |
| | (hanging) from | 1 | 7.1% |
| A2-B1 | on | 15 | 88.2% |
| | in | 1 | 5.9% |
| | (hanging) from | 1 | 5.9% |

*Table 16 – TR pierces through the LM (group comparison)*

The data obtained for relations of partial inclusion were also compared. Descriptions of item 3 (boat on the sea) in Croatian were quite similar – 7 participants (50%) encoded the relation with *'na'* in the first group, followed by *'u'*, used by 5 participants (35.7%), whereas the rest of their answers were invalid. The second group was slightly more likely to use *'na'* (10 participants in total, i.e. 58.8%), 4 participants opted for *'u'* (23.5%), and descriptions containing either *'po'* or no preposition (dynamic interpretations) each occurred once (5.9%). One answer was also counted as invalid. We observe a reverse split between the prepositions *'on'* and *'in'* in the first group when we compare it to their Croatian equivalents. In English,

*'in'* was the preferred description, occurring in 57.1% of answers, whereas *'on'* was less frequent (28.6%). In the second group, the frequencies of *'in'* and *'on'* were almost identical (41.2% and 47.1% respectively). A few observations can be made based on the data: 1) The second group was more likely to focus on support in both languages when compared to the first group; 2) the saliency of support decreased more in the English descriptions provided by the first group; 3) the saliency of containment increased more in the English descriptions of the first group, but the differences related to containment were less pronounced than those related to support.

The Croatian descriptions of item 22 (cork in a bottle) were almost identical, even though we can once again conclude that the participants in the second group were more likely to focus on support. *'Na'* was used by 57.1% (8 in total) of the participants in the first, and 58.8% participants in the second group (10 in total). Six participants (42.9%) in the first group encoded the relation with *'u',* and 7 participants (41.2%) in the second group used the same preposition. In English, there was more variety in answers in general in both groups. *'In'* was the preferred preposition in the first group, used by 57.1% (8 participants), followed by *'on',* which occurred with a frequency of 3 (21.4%) and *'on top of'* (14.3%), whereas one participant used multiple prepositions. The pattern was fairly similar in the second group – 8 participants (47.1%) encoded the relation with *'in';* 5 (29.4%) with *'on'* and 2 (11.8%) with *'on top of'*. There were also single instances of descriptions containing the preposition *'at'* and *'inside'*.

**Item 3 - Croatian**

| Group | | N | % |
|---|---|---|---|
| C1-C2 | na | 7 | 50.0% |
| | u | 5 | 35.7% |
| | invalid answer | 2 | 14.3% |
| A2-B1 | no preposition | 1 | 5.9% |
| | na | 10 | 58.8% |
| | u | 4 | 23.5% |
| | po | 1 | 5.9% |

| | | | |
|---|---|---|---|
| | invalid answer | 1 | 5.9% |

**Item 3 - English**

| Group | | N | % |
|---|---|---|---|
| C1-C2 | on | 4 | 28.6% |
| | in | 8 | 57.1% |
| | invalid answer | 2 | 14.3% |
| A2-B1 | on | 8 | 47.1% |
| | in | 7 | 41.2% |
| | at | 1 | 5.9% |
| | invalid answer | 1 | 5.9% |

**Item 22 - Croatian**

| Group | | N | % |
|---|---|---|---|
| C1-C2 | u | 6 | 42.9% |
| | na | 8 | 57.1% |
| A2-B1 | u | 7 | 41.2% |
| | na | 10 | 58.8% |

**Item 22 - English**

| Group | | N | % |
|---|---|---|---|
| C1-C2 | in | 8 | 57.1% |
| | on | 3 | 21.4% |
| | on top of | 2 | 14.3% |
| | multiple prepositions | 1 | 7.1% |
| A2-B1 | in | 8 | 47.1% |
| | on | 5 | 29.4% |
| | on top of | 2 | 11.8% |
| | inside | 1 | 5.9% |
| | at | 1 | 5.9% |

*Table 17 – Partial inclusion (group comparison)*

In order to compare the apparent saliency of support and containment in reference to item 22, we must not limit the analysis to *'na', 'on', 'u'* and *'in'*. '*On top of'* would also fall under the category of support, whereas *'inside'* also implies containment. If we combine all of the prepositions used by the participants that imply support, and do the same for all the prepositions implying enclosure, we can observe the following pattern: in the first group, the number of participants focusing on support diminished when they were asked to lexicalise the

relation in English from 57.1% (*'na'*) to 35.7% (*'on'/'on top of'*), which yields a difference of 21.4%. In the second group, 58.8% focused on support in Croatian, and 41.2% in English (a decrease of 17.6%). The number of participants focusing on containment in the first group went from 6 (42.9%) in Croatian to 8 (58.1%) in English. In the second group, 41.2% (7 in total) focused on enclosure in Croatian, and 53% (9 participants) in English.

In summary, we could say that NSs of Croatian both at levels of advanced and independent users showed the tendency to 'switch' to more native-like descriptions, but this 'shift' was slightly more likely to happen in the group of advanced users.

Finally, the category of 'impaired LMs' (what Herskovits (1986), in Zhang, 2013) described as 'gaps or objects embedded in physical objects' was also considered relevant for result comparison. The Croatian descriptions of item 6 (hole in a towel) were similar in the sense that both groups mainly focused on support. We therefore observe almost identical frequencies of the preposition *'na'* (10 participants, i.e. 71.4% in the first group, and 12 (70.6%) in the second group). *'U'* was used more frequently by the second group (23.5%) when compared to the first group (7.1%, i.e. only one participant). This divergence can probably be explained by a large number of invalid answers (21.4%) in the first group, that occurred due to misinterpretation of the TR (stain, instead of a hole). Consequentially, this issue does not allow for further comparison in terms of English prepositions that were used, but we can once again look at 'the switch' in focus within groups. Even though 71.4% of the participants in the first group used the preposition *'na'* in Croatian, only 35.7% (5 subjects) used *'on'* in English, whereas 42.9% (6 participants) used *'in'*. In the second group, *'on'* also occurred less frequently than Croatian *'na'* (in 52.9% of all answers), whereas *'in'* was used more frequently than *'u'* (47.1% vs 23.5%). The data further confirms the fact that, even though 'shifts' in conceptualisation were likely to happen in both groups, their effects were more evident in the responses of more proficient speakers. More specifically, the saliency of support in the English

descriptions reduced by 35.7% in the first, i.e. by 17.7% in the second group, whereas the saliency of containment increased by 35.8% in the first group, and by 23.6% in the second group.

Item 11 (crack in a mug) was quite different, as there were no instances of the preposition *'u'* in either of the groups. In the first group, the majority (78.6%, i.e. 11 participants) encoded the relation with *'na'*, whereas two subjects (14.3%) opted for a description without a preposition (*'šalica je napuknuta/ima pukotinu'* – *'the cup is cracked/has a crack'*). In the second group, 15 participants (88.2%) chose *'na',* and the remaining 11.8% (two participants) did not use a preposition. In English, however, *'on'* was used by 9 participants (64.3%) in the first, and by 14 (82.4%) in the second group. *'In'* was used by only a small number of participants (2, i.e. 14.3% in the first group, as well as 2, i.e. 11.8% in the second group). Finally, the frequency of descriptions without a preposition remained unchanged in the first, whereas it slightly decreased in the second group (11.8% in Croatian vs 5.9% in English). Based on the results, we can only make two general observations. Firstly, the saliency of support reduced more in the first group. Secondly, the function of containment was not evident in the Croatian descriptions, whereas it was highlighted by some participants when they were asked to lexicalise the relation in English.

**Item 6 - Croatian**

| Group | | N | % |
|---|---|---|---|
| C1-C2 | na | 10 | 71.4% |
| | u | 1 | 7.1% |
| | invalid answer | 3 | 21.4% |
| A2-B1 | na | 12 | 70.6% |
| | u | 4 | 23.5% |
| | pri (sredini) | 1 | 5.9% |

**Item 6 - English**

| Group | | N | % |
|---|---|---|---|
| C1-C2 | on | 5 | 35.7% |
| | in | 6 | 42.9% |

| | | | |
|---|---|---|---|
| | invalid answer | 3 | 21.4% |
| A2-B1 | on | 9 | 52.9% |
| | in | 8 | 47.1% |

**Item 11 - Croatian**

| Group | | N | % |
|---|---|---|---|
| C1-C2 | ima pukotinu/napuknutaje | 2 | 14.3% |
| | na | 11 | 78.6% |
| | invalid | 1 | 7.1% |
| A2-B1 | ima pukotinu/napuknutaje | 2 | 11.8% |
| | na | 15 | 88.2% |

**Item 11 - English**

| Group | | N | % |
|---|---|---|---|
| C1-C2 | has a crack/ is cracked | 2 | 14.3% |
| | on | 9 | 64.3% |
| | in | 2 | 14.3% |
| | invalid answer | 1 | 7.1% |
| A2-B1 | has a crack/ is cracked | 1 | 5.9% |
| | on | 14 | 82.4% |
| | in | 2 | 11.8% |

*Table 18 – Ruptures in LMs (group comparison)*

## 8. Discussion

The first hypothesis referred to different ways of encoding topological relations in Croatian. It was hypothesised that NSs of Croatian will predominantly use prepositions *'na'* and *'u'* followed by the locative case in order to encode topological relations exemplified by the pictures. It was also assumed that some descriptions might contain a verb in its passive form and a PP. This hypothesis was confirmed, even though verbs did not occur frequently. Additionally, some items were described with an active verb and a PP, mostly when they were interpreted as dynamic.

Six of the 32 items were described exclusively with the verb *'biti'* (*'to be'*) followed by a PP: items 4 (butter on a knife), 9 (shoe on a foot), 12 (cloud above a mountain), 16 (tablecloth on a table), 22 (cork in a bottle) and 29 (corset around a woman's waist). This could probably be explained by the fact that this set of images imposes a highly static construal and that the position of the TRs is unlikely to change (apart from the cloud above a mountain). If we refer back to Langacker's (2010) observations on the always-present awareness of how an object reached its position, how its position can be changed, etc., we could state that neither of these underlying notions is clearly displayed in the images nor particularly 'strong' in the mind of the observer. The relations shown in the images are the result of previous actions that are viewed as relatively 'distant' (in space, but arguably, in time as well) from the current state of affairs. For example, the only clear observation that can be made when we look at item 4 is that there is some kind of leftover dirt on the knife (it is not even clear that this is butter specifically; most participants simply viewed it as a stain). We cannot make assumptions on who used the knife, why or in what way. Additionally, we are more likely to assume that someone performed an action *with the knife* (the LM) than with the butter. The same can be said about the relation in item 22 (someone *closed the bottle*). In summary, the performed action (as well as the agent) is generally unimportant when we try to describe these images, and the speakers presumably

do not feel the need to further specify the relation – the verb *'to be'* and a PP are sufficient to express the relations in their entirety, as there is no need to highlight the point or the type of contact.

Most of the items were described with a verb other than *'biti'* and *'nalaziti se'* ('existential there') in less than 50% of the cases, probably because the participants were only asked to answer the question *'Where is the object that the arrow is pointing at?'*. The spatial information encoded in their responses was therefore limited in order to answer a specific question. Had they been asked to simply describe the pictures, spatial information may have been distributed across the phrase in a much more noticeable manner. This approach, however, would have made it considerably more difficult to analyse the usage (and consequentially, the meaning) of prepositions.

An even smaller number of pictures was seen as dynamic, which is not surprising, since the instrument was originally designed to study static topological relations. Item 13 (arrow in an apple) was typically viewed as dynamic, which also means that a combination of a verb and a PP was most commonly found in the descriptions of this relation. The best explanation for such a large percentage of dynamic descriptions is twofold: firstly, most of the participants wanted to specify that the arrow was *'passing **through**'* (or that it *'pierced'*) the apple. These lexicalisation patterns make it clear that the arrow entered the apple at a specific point, went all the way through the apple, and exited on the other side. The interlocutor can then retrieve the picture of an arrow being stuck in the (probably middle of) apple, with both of its ends visible. Secondly, the observer presumably feels the need to transfer what they see in a more detailed way, as this is not a relation that we frequently encounter in our everyday experience. In other words, the picture probably 'stood out' from the set. Other relations that were sometimes viewed as dynamic were those exemplified by items 24 (raindrops on a window), 20 (flag on a flagpole), 25 (apple on a stick) and 28 (clothes on a clothesline). Dynamic

descriptions of items 24 and 20 can largely be attributed to the perceived environmental factors – liquid substances are never purely static, and this is especially true of raindrops on a vertical surface. Due to the force of gravity, we would expect them to slide down the window (or even, imagine that it is still raining). Similarly, the shape of the flag in item 20 implied the presence of wind, causing the participants to use verbs such as *'lebdjeti'* (*'to float'*) or *'vijoriti'* (*'to fly'*). Items 25 and 28 can largely be dismissed when we discuss the dynamic nature of the relations, as item 25 was seen as dynamic when the participants chose the wrong TR (essentially equating it with *'arrow in an apple'*). The most commonly used verb in order to describe item 28 was *'visjeti'* (*'to hang'*), which does not in itself imply motion, but emphasizes the 'hanging' nature of the relation.

In general, we could say that the usage of a verb followed by a PP was mostly related to the need to specify the type of contact established between the TR and the LM. This explains why almost half of the participants lexicalised item 21 (ladder against a wall) with *'naslonjene na'* (*'leaned against'*). To simply say that the ladder is *'na zidu'* (*'on a wall'*) would not impose the construal shown in the image. It would not be clear that the contact was established at specific points, and that there is some distance between the TR and the LM, i.e. that the largest portion of the surface of the ladder is not in contact with the wall. As we have already mentioned, an English speaker can simply opt for *'against'*, but the Croatian language does not have an equivalent preposition used for encoding such relations. This reasoning can account for other similar examples: items 15 (hose around a stump) and 18 (hose over a stump) (used as a control item) were frequently described with a verb and a preposition because the meanings of the prepositions *'oko'* (*'around'*) and *'preko'* (*'over'*) are more specific when compared to *'na'* and *'u'*. For this reason, they collocate with fewer verbs than *'na'* and *'u',* but are rarely used after the verb *'biti'* (*'to be'*).

Finally, special attention was given to descriptions containing a prefixed verb and a PP in which the preposition is a cognate of the prefix. Only a few items were commonly described with such expressions - items 21 (ladder against a wall) (57%), 15 (hose around a stump) (29%) and 10 (papers on a needle) (22.6%). Since this repetitive structure is typically analysed in the context of motion events, we cannot relate it to most findings presented earlier in the thesis. We can only establish a connection between the manner encoded with a verb in lexicalising motion events (highlighted by using this repetitive structure), and quite a *specific type of contact* that is (eventually) established in a static spatial scene. In order to impose a particular construal, the participants had to either a) choose a simple preposition, but specify the relation with a prefixed verb (items 10 and 21) or b) choose a more specific preposition and adjust the verb accordingly (so that it collocates with the preposition) (item 15). We could also argue that this lexicalisation pattern in static spatial descriptions (as well as in dynamic contexts) implies a sense of completion of a specific action.

Let us now turn to the *'on-in'* continuum of topological relations in Croatian, and analyse how NSs of Croatian generally interpret this continuum when they are asked to lexicalise the same relations in English. It was hypothesised that the continuum would largely overlap (especially at end points), but that there might be some differences when it comes to boundaries between categories. This hypothesis was confirmed.

As was expected, items representing highly prototypical examples of *'na'* led to a high uniformity in answers. Relations that could be categorized as 'support from below' and 'adhesion' were encoded with *'na'* in Croatian and *'on'* and English in over 90% of cases, with the exception of item 24 (showing raindrops on a window) (80.6% both *'na'* and *'on'*). This difference could be explained by the fact that speakers often viewed the relation as dynamic, which accounts for all other answers that contained a different preposition in Croatian, as well as for 12.9% of variation in answers in English (*'hitting the window'; 'falling against'; sliding*

*down'*). Furthermore, as we have already explained, item 24 (unlike all the other pictures belonging to the first two subgroups) exemplifies a vertical, rather than a horizontal relation, which could also have an influence on how speakers interpret the scene (Šarić (2008) points out that horizontal relations demonstrate a lesser degree of location control in Croatian).

Relations of fixed attachment serve as further confirmation: item 9 (a shoe on a foot) was more commonly described with *'na'* (in over 90% of cases), even though the attachment is arguably less 'fixed' when compared to the other item in this category (26 – hooks on walls), which exemplifies a horizontal relation. Based on these examples, we could conclude that the alignment along an axis seems to be more salient in Croatian than the perceived degree of fixedness/attachment. Over 80% of all participants did encode the relation in item 26 with *'na'* and *'on'*, but *'u'* (*'in'*) also occurred, as a result of different choice of the LM (the room, i.e. an enclosed space). Additionally, some participants opted for *'zakačene za'* (*'hooked (on)to'*), thereby distributing spatial information between the verb and the preposition, presumably in order to emphasize the type of attachment. However, this specific verb is more commonly related to point-to-point attachment, and might have been triggered by the object (the TR) itself.

Similarly to item 26, item 27 (bugs on walls) was mostly encoded with *'na', e*ven though some participants again chose the room as the LM, instead of the walls. Additionally, probably due to the fact that TRs were animate, this scene was sometimes viewed as dynamic, and (in addition to a preposition) encoded with a verb typically associated with the movement of bugs, such as *'puzati'* and *'gmizati'* (*'to crawl'*). It was also confirmed that items 20 (flag on a flagpole) and 21 (ladder against a wall) represent relations that would fall somewhere in between fixed and point-to-point attachment (encoded with *'na'* by 87.1% and 93.5% of the participants respectively). More variety in the descriptions of the item 20 was a result of different choices of the LM, which is not surprising, given that there are more objects present in the picture when compared to items 21 and 27.

In general, we could also argue that the Croatian continuum follows the one designed by Bowerman and Pederson in terms of point-to-point attachment as well. We can also observe a pattern emerging within this group of relations. Item 14 (clothespin on a clothesline) would come first (*'na'* was used in 96.8% of cases), followed by item 19 (apples on a tree (typically encoded with *'in'* in English) (83.9%) and item 28 (clothes on a clothesline) (80.6%). Item 30 (an earring on an ear) comes next (77.4%), proving that for NSs of Croatian, this relation is viewed as point-to-point attachment (and not as a TR piercing through the LM, as was considered by Feist (2010)). Finally, item 7 (balloon on a stick) was encoded with *'na'* by 71% of the participants. The results seem to suggest that item 32 (a handle on a bag) would come last in this category (65% of all the descriptions contained the preposition *'na'*), but due to a large number of invalid answers, we cannot discuss this item in detail. The results obtained for relations in which the TRs are higher than LMs with no contact established (control items) are also worth noting in this context. The preposition *'iznad'* (*'above'*) occurred more frequently in the descriptions of item 12 (a cloud above a mountain) than in those of item 5 (lamp above a table) because of the 'hanging' nature of the lamp, which is attached to the ceiling at a specific point. This caused the participants to use other prepositions, such as *'na'* and *'sa'* (*'from'*).

Most differences between Croatian and English are found in the middle of the continuum, as was initially predicted. It was assumed that relations of encirclement with contact would come next, followed by relations in which TRs are impaled/spitted on LMs. This study reveals the possibility of not only a different cut-off point, but of these two categories being reversed altogether for the speakers of Croatian. Encirclement with contact was exemplified by items 2 (bow on a candle), 15 (hose around a tree stump) and 29 (corset around a woman's waist). Relations in items 2 and 29 were encoded with *'na'* by only 58.1% of all participants, whereas *'na'* was never used for item 15. This discrepancy between the three items might be explained by the fact that it is arguably easier to interpret the front part of the woman's

body and the front surface of the candle as providing support for the TR, thereby controlling its position. When it comes to a tree stump, however, we would expect the hose to be supported by the flat, upper surface of the stump in order to trigger the use of *'na'*. We must also take into consideration the fact that the participants were previously exposed to a similar picture, in which the hose was placed precisely on the upper part of the stump (supported from below), which emphasized the difference between these relations. In any case, there might be a cut-off point between the prepositions *'na'* and *'oko'* for describing relations of encirclement with contact, but the underlying motivation for choosing one expression over another is not entirely clear.

If we were to focus only on the remaining two items of the category, and compare them to relations in which the TR is impaled/spitted on an LM, we would still be able to discuss the potential reversal of the categories. Item 10 (papers on a needle) was described with *'na'* by the overwhelming majority of the subjects (93.5%), whereas 51.6% of the subjects chose the same preposition for item 25 (an apple on a stick). Firstly, we must address the differences between these two pictures in order to be able to continue our discussion about categories. Even though *'na'* occurred only in about half of the descriptions of the latter picture, a great portion of the remaining answers (35.4%) can be explained by a different choice of the TR (the stick) or the LM (air). The remaining participants focused on the dynamic aspect of the scene and tried to explain what happened, instead of locating the objects, resulting in descriptions such as *'jabuka je probodena (sa) štapom'* (*'the apple is pierced by (*lit. w*ith) a stick'*).

When we calculate the mean percentages of the preposition *'na'* used to encode these categories of relations (taking item 15 out of the equation for the abovementioned reasons), we are looking at 58.1% for encirclement with contact and 72.6% for TRs impaled/spitted on LMs. This leads me to believe that these two categories could perhaps be reversed in the minds of Croatian speakers.

We must not forget that the apple in item 25 is positioned more vertically when compared to papers on a needle in item 10, as well as the differences in terms of voluminosity, i.e. dimensions – two-dimensional papers (closer to *'na'/'on'*) vs three-dimensional apple (closer to *'u'/'in'*). Additionally, the front surface of the papers on a needle is facing the sky/ceiling, whereas the front surface of the apple is facing the observer. This difference in positioning might have contributed to a more two-dimensional interpretation of the relation in item 10, differentiating it from that shown in item 13. This explanation, based on the distinction between the images, would point to a different cut-off point within the category of TRs impaled/spitted on LMs. This matter therefore requires further clarification, that could potentially be resolved by specifically asking the participants to locate the apple as the TR in item 25. All things considered, we could still speculate about these potential distinctions between the Croatian and the English on-in continuum. In summary, we could say that we have at least identified a potential border between the categories based on some elements of the spatial scene (physical properties of objects and their positioning on the axis), or identified a much larger difference between the continuums.

Relations in which the TR pierces through the LM (after the final analysis, exemplified only by item 13 (an arrow in an apple)) have proven to be slightly problematic. The preposition *'na'* occurred only in 25.8% of all descriptions, whereas 51.6% of the participants used the preposition *'kroz'* (*'through'*). Since this preposition mainly collocates with verbs of motion (*'proći'* and *'ići'* – *'to pass'* a*nd 'go'*) and does not occur in static contexts (It is incorrect to say, for example, *'Strijela **je** kroz jabuku'* (*'The arrow **is** through the apple'*)), we cannot draw conclusions on the on-in continuum based on this example. The low percentage of answers containing *'u'* can therefore be attributed to the perceived dynamic nature of the scene. Item 30 (an earring in an ear), originally categorized by Feist (2010) as a similar scene, was

lexicalised with *'u'* by only three (12.9%) of the subjects, proving that the 'hanging' nature of the TR places this item in the category of point-to-point attachment in Croatian.

Relations of partial inclusion have shown to be more straightforward in the context of the discussion on the continuum – items 3 (a boat on the sea) and 22 (a cork in a bottle) were both described with *'na'* in 54.8% of cases. The remaining answers predominantly contained the preposition *'u'* (*'in'*), which was the only other preposition used for item 22 (45.2%), and which occurred in 29% of the descriptions of item 3. Additionally, item 3 was sometimes also perceived as dynamic, resulting in descriptions *'plovi morem' ('sailing the sea')* and *'plovi po moru'* ('*is sailing along the sea'*).

A particularly interesting category consisted of pictures showing ruptures/cracks in LMs (what Herskovits (1986) in Zhang (2013) describes as 'gaps or objects embedded in physical objects'). Item 11 (crack in a mug) was more commonly described with *'na'* (by 83.9% of the subjects) when compared to item 6 (hole in a towel) (67.7%). This is somewhat surprising, given that a mug is more likely to be perceived as possessing voluminosity (three-dimensionally) when compared to a towel, which we would expect to be conceived as flat and two-dimensional. It seems that, regardless of this distinction, the front surface of the cup is interpreted as providing support for the crack. Additionally, the crack in the picture is located on the front, outer surface of the mug. Had the image shown a mug from above, and a crack on its bottom surface, for example, we might have observed different descriptions. The higher occurrence of *'u'* in the description of item 6 might be related to the TR itself – holes are typically round in shape and frequently located as being *'in'* something else. We can recall Šarić's (2008) example of *'rupa u zemlji'* (*'hole in the* ground'), or a frequent metaphorical expression *'rupa u zakonu'* (lit. *'loophole in a law/legislation'*). It is therefore possible that the very word causes the speaker to expect (and, in this case, use) the preposition *'u'*. Both of these

images, however, point to the saliency of support in Croatian, even though we would need more similar pictures to truly test and categorize these relations.

The third, and final, hypothesis was formulated with respect to the potential differences between the two groups of participants. It was hypothesised that the level of proficiency would have an effect on the interpretation of the 'on-in continuum' in L2. In other words, it was expected that the first group of participants (whose proficiency level is C1-C2) would provide more native-like English descriptions than the second group (proficiency level A2-B1). The hypothesis was tested based on items 3, 6, 11, 19, 21, 22, and 30, since these pictures show relations that are encoded differently in Croatian than in English. While there are indications that this assumption may hold true, it was not entirely confirmed.

The most consistent observable pattern is as follows: The saliency of support in both groups decreased when the participants were asked to lexicalise the relations in English, whereas the saliency of containment increased. These differences were more notable in the answers provided by the first, than by the second group. These findings seem to be in line with the initial hypothesis.

We observe the largest differences between the groups in their English descriptions of item 30 (earring on an ear). In the first group, *'on' w*as used less frequently than *'na'*, whereas *'in'* occurred more frequently than *'u'* (a decrease, i.e. an increase of around 21%), which is consistent with the pattern described above. Even though we would normally expect to observe the same tendencies in the second group (albeit reflected in fewer answers), the second group seemed to demonstrate a reverse pattern – *'on'* was used more frequently than *'na',* whereas *'in'* was used less than *'u'.* As this was highly unusual, it was necessary to try to account for these differences. The seemingly reversed pattern observed in the second group can largely be dismissed, since the differences were only reflected in +/- 5.9% of the answers. Fourteen

participants used *'na'* in Croatian, which increased to only 15 answers containing *'on'* in English. Similarly, only two Croatian descriptions contained *'u'*, which then decreased to only one English description containing *'in'*. We cannot speak of general tendencies based on such small differences, and can therefore treat these shifts in focus as exceptions.

If we were to treat item 30 as an anomaly due to the abovementioned issues we find within the second group, then the differences are actually the most evident in the descriptions of item 19 (apples on a tree). The saliency of support reduced by 28.6% (13 answers containing *'na'* to 9 answers containing *'on'* in English), whereas the saliency of containment increased by 21.5% (1-4 answers) in the first group. In the second group, however, the number of descriptions containing *'na'* in Croatian and *'on'* in English was identical. Furthermore, none of the participants encoded the relation with *'u'* or *'in'*. The results can, in part, be explained by the fact that some of the participants in the second group wanted to highlight the 'hanging' nature of the TR, opting for the description *'vise sa'* in Croatian, i.e. *'hanging from'* in English. However, the answers provided by the first group point to a higher awareness of the differences in conceptualisation. Their Croatian and English descriptions were considerably different, whereas we observe no variation in answers in the second group. This means that the participants in the second group were more likely to 'stick to' their original descriptions, regardless of the language used, whereas the first group was more likely to 'shift' from a hanging relation (point-to-point attachment) in Croatian to a relation of containment in English.

While the seemingly reverse support-containment pattern in the second group was dismissed in the analysis of item 30, we cannot ignore the absence of the shift to a more native-like way of encoding the relation. This means that item 30 would come second in terms of the differences between the groups. Since the earring in the picture was shaped like a hoop, the largest portion of its surface was actually located beneath the ear. Its 'hanging' nature was therefore highlighted in Croatian, and the participants were more likely to focus on point-to-

point attachment (equating this relation with, for example, clothespin or clothes on a clothesline). In other words, it was evident that (due to the force of gravity), the earring would fall to the ground if were not attached to the ear. As we have already seen, this type of location control is typically encoded with *'na'* in Croatian. If the image showed a smaller, round earring, whose surface is largely 'surrounded' (or enclosed) by the ear, it would be interesting to see how many participants would also initially opt for *'u'* in Croatian (and whether the differences between the descriptions of the two groups would be less pronounced). Nonetheless, English treats this particular relation as a TR 'piercing through' the LM, which is usually lexicalised with *'in'*. The more proficient group of the participants again demonstrated a noticeably higher awareness of the differences between the Croatian and the English on-in continuum.

Following items 19 and 30 was item 6 (hole in a towel). Despite the large percentage of invalid answers, we can still conclude that the first group was more likely to provide more native-like descriptions, even though the differences between the groups were less noticeable when compared to images showing hanging TRs. The differences continued to decrease gradually, and were far less evident in the descriptions of item 11 (crack in a mug).

The effects of proficiency levels on encoding relations of partial inclusion (exemplified by items 3 (boat on the sea) and 22 (cork in a bottle)) seem fairly small. When lexicalising these relations in English, the frequency of prepositions implying support reduced by 21.4% in the first, and by 11-17% in the second group. Similarly, the number of answers containing prepositions expressing containment increased by 15-21% in the first, and by 11-17% in the second group. The biggest differences between the groups are reflected in the decreased saliency of support in the English descriptions of item 3 (decreased by 21.4% in the first, and by 11.7% in the second group).

In general, we could argue that the level of proficiency had the least influence on the lexicalisation of item 21 (ladder against a wall). The frequency of the preposition *'against'* was virtually identical in the two groups, but it is worth noting that *'on'* occurred more frequently in the second group (in 64.4% of all answers in the second group and 50% in the first). Even though the overwhelming majority of the subjects in the first group encoded the relation with *'na'* in Croatian, they were less likely to translate from L1, perhaps noticing that *'on'* would not be the English equivalent of *'na'* in this context, opting instead for prepositions such as *'by'* and *'next to'*. If we were to treat the usage of *'on'* as an error, then these seemingly small effects of proficiency levels are debatable. In any case, we could argue that even the more proficient group made a large number of errors, and displayed difficulties in accessing the most appropriate English preposition.

Based on everything we have discussed so far, and provided our conclusions pertaining to item 30 are correct, then we can observe the following pattern:

THE EFFECTS OF L2 PROFICIENCY LEVELS ON THE ENCODING OF TOPOLOGICAL RELATIONS IN ENGLISH

| POINT-TO-POINT ATTACHMENT + HANGING TRs |
| --- |
| apples on a tree<br>⇩<br>earring in an ear<br>⇩ |
| IMPAIRED LMs |
| hole in a towel<br>⇩<br>crack in a mug<br>⇩ |
| PARTIAL INCLUSION |
| boat on the sea<br>⇩<br>cork in a bottle<br>⇩ |

| ‘AGAINST’ |
| --- |
| ladder against a wall |

The pattern may seem somewhat illogical if we only take into account the Croatian and English on-in continuums. However, there are a number of different factors that need to be taken into consideration. Firstly, the effects of proficiency levels seem to decrease as the ambiguity of the topological relation increases. This might help us account for the majority of the pattern illustrated above: If the relation shown in the picture was fairly straightforward for NSs of Croatian, the level of proficiency had a more noticeable influence on the lexicalisation in L2. If, on the other hand, the image allowed for the usage of more than one preposition (exemplifying an in-between relation, that implies both support and containment), or at least allowed for more variety in the descriptions (recall, for instance, *‘the mug is cracked’*), the level of proficiency had a less noticeable effect. High uniformity (or lack thereof) of the Croatian descriptions seems to support this conclusion.

Item 21 (ladder against a wall) seems to be inconsistent with this pattern, but we must keep in mind that the preposition *‘against’* in its static sense is presumably much less frequent in both L2 input and output. This might explain why NNSs of English in general experience more difficulties with the acquisition of *‘against’*. As Mukattash (1985) points out, L2 learners experience more difficulties in acquiring prepositions that do not exist in their native language.

Finally, we can observe that the item that triggered the ‘shift’ from Croatian into English mode of conceptualisation in the largest number of answers was item 6 (hole in a towel). The saliency of support reduced by 35.7% in the first and by 17.7% in the second group, whereas the saliency of containment/inclusion increased by 35.8% in the first, i.e. by 23.6% in the second group. This finding, while interesting, is extremely difficult to account for based on

a single picture. As we have already seen, we would need more examples in order to analyse how similar relations are conceptualised and lexicalised both in Croatian and in English in order to make any reasonable assumptions.

Even though we were able to discuss most of the obtained data, we must keep in mind that the study was conducted on a small number of participants, and that there was no control group. We are therefore unable to determine whether any of these differences were statistically significant. Testing these assumptions would require larger groups of participants with varying proficiency levels (including a group consisting of NSs of English), as well as more items per category of a specific topological relation.

## 9. Conclusions

The study hoped to contribute to the existing body of research on spatial language in general, and to provide empirical evidence on the semantics of Croatian prepositions, predominantly focusing on *'na'* and *'u'*. One of its primary aims was to explore how NSs of Croatian distribute spatial information across an utterance in natural, spoken interaction. It was found that the participants mainly encoded the relations exemplified by the pictures with a copulative verb and a prepositional phrase comprising a preposition (typically *'na'* or *'u'*) and an NP in the locative case. While some descriptions did contain a verb other than *'biti'* in its passive form followed by a prepositional phrase, such verbs occurred only in small percentage of cases. Additionally, some of the answers contained a repetitive structure consisting of a prefixed verb followed by a PP in which the preposition is the cognate of the prefix. The results seem to suggest that this repetitive structure (and the usage of verbs in their passive form in general) was typically triggered by the participants' need to be more specific in order to accurately lexicalise the relation. In other words, it was used when the participants estimated that the usage of a preposition in combination with a copulative verb would leave room for interpretation (or be unclear in general) if left unspecified. In this sense, it seems that ladder leaned against a wall (item 21), a garden hose laid over a stump (item 15) and papers pierced by a needle (item 10) required additional specification by a large number of subjects. Furthermore, participants sometimes opted for an active verb, primarily when they viewed a spatial scene as dynamic. Item 13 (arrow in an apple) has proven to be particularly interesting. Most of the participants focused on the action that preceded the spatial relation, and predominantly provided descriptions consisting of a verb (such as *'probosti', 'ići'* and *'prolaziti'*) in combination with the preposition *'kroz'* (*'through'*). We could even argue that this particular topological relation inherently imposes a particular construal - firstly, it implies a quite specific prior action that has resulted in the relation, and secondly, it suggests that the

arrow (used as a tool in this action) should be viewed as the TR, and the apple as the LM (and the goal of the action). This conclusion was drawn based on the fact that the relation shown in item 25 (apple on a stick) was often equated with the one shown in item 13, and was frequently lexicalised in the same way.

The Croatian descriptions provided by the participants seemed to be fairly consistent with the English 'on-in continuum' of topological relations. Nonetheless, this study seems to point to a significant difference between Croatian and English mode of spatial conceptualisation. It was revealed that, while relations of encirclement with contact are typically closer to the prototypical meaning of *'on'* than relations in which the TR is impaled/spitted on an LM, in Croatian this might not be the case. NSs of Croatian seem to focus on a higher degree of location control displayed by LMs such as needles or other sharp objects. The fact that the position of the TRs is more fixed in such relations seems to be more salient when compared to the function of support that is evident in relations of encirclement with contact. Papers on a needle are therefore closer to the prototypical meaning of *'na'* than, for example, a bow supported by the front surface of the candle or a corset tied around a woman's waist. Even though this is the only reasonable assumption that we can draw from the results, we must refrain from making such claims with certainty. We would need to conduct a larger study, including both more participants and more items per category of a spatial relation in order to clarify these findings. Additionally, the study identified two potential cut-off points within categories. Firstly, the two items belonging to the category of 'impaled/spitted on' relations were not treated equally. Item 10 (papers on a needle) was more commonly described with *'na'* when compared to item 25 (apple on a stick). Secondly, even though items 2 (bow on a candle), 15 (hose around a stump) and 29 (corset around a woman's waist) all exemplify encirclement with contact, *'na'* was the preferred description of items 2 and 29, whereas the relation in item 15 was most commonly encoded with *'oko'* (*'around'*). It was assumed that

these differences in interpretation could be attributed to some physical or geometrical properties of the scene, but this matter certainly requires further clarification.

It also seems that gaps or objects embedded in physical objects (item 6 – hole in a towel and item 11 – crack in a mug) are predominantly encoded with *'na'* in Croatian, whereas NSs of English would typically view these relations as examples of inclusion. It seems that in this respect, Croatian is closer to Mandarin (which, according to Zhang (2013) also places these relations closer to the *'on'* end of the continuum) than to English. Interestingly, it seems that item 6 was more ambiguous, whereas item 11 led to a higher uniformity in answers.

Finally, we could conclude that the category of 'hanging TRs' analysed by Šarić (2008) is particularly salient for NSs of Croatian, since the results have shown that 1) They are almost exclusively encoded with *'na'* in Croatian (apples ***on***, not ***in*** the tree; earring ***on,*** not ***in*** an ear) and 2) the 'hanging' nature of the TR is often highlighted by using the verb *'visjeti'* (*'to hang'*) in conjunction with the preposition *'na'*.

In addition to analysing the on-in continuum based on empirical evidence, the study hoped to determine whether the level of proficiency in L2 had an effect on the lexicalisation of topological relations in English. After comparing the descriptions provided by the two groups, we could conclude that the participants have shown a general tendency to 'switch' to a more native-like type of spatial conceptualisation (mainly in terms of reduced saliency of support and increased saliency of containment) when encoding the relations in English. This 'shift' in focus was more noticeable in the answers provided by the more proficient group (C1-C2 level of proficiency), even though a higher level of proficiency did not have an equal effect on all of the tested items. The clarity of the spatial relation and frequency of exposure to particular contexts seem to be linked to higher effects of proficiency levels, whereas these effects gradually decrease as we move towards more ambiguous and less common examples. These

findings may also have practical implications for L2 classrooms. Teachers of English nowadays mostly point out that learning prepositions is a matter of practice and exposure, as it is difficult to formulate a set of rules that can be applied across various contexts. I would argue, however, that it would perhaps be beneficial to focus on (or at least introduce the concept of) *function*. For example, pointing to the similarities between different types of relations implying containment (apples in a tree, boat in the water, cork in a bottle, people in a picture, crack in a mug, etc.) might help the learners understand the underlying principles which are used to estimate whether something 'counts' as containment in English or not, and why. This approach might help the learners to internalize general rules that are directly linked to differences in spatial conceptualisation between languages. Of course, such elaborations would probably be too complex for young learners to comprehend, so these implications primarily refer to teenagers and adults.

While all of the conclusions presented in this section stem from a careful analysis of the obtained data, the study's limitations must be taken into consideration. It has already been highlighted that this type of research would require a larger number of participants, and more items per category of spatial relation (preferably including objects with various physical and geometrical properties). These limitations prevent us from discussing the results in terms of statistical significance, especially when it comes to group comparison.

## 10. Suggestions for further research

Apart from adding more materials to the elicitation tool (preferably representing objects with various physical and geometrical properties) and including more participants (which would ideally also presume a control group (NSs of English)), it would perhaps be best to limit the scope of future research. Since this study has shown that the end points of the continuum in Croatian and English largely overlap, it might be beneficial to predominantly focus on those categories of relations that have proven to be somewhat ambiguous for the participants. These categories of relations include gaps or objects embedded in physical objects, TRs impaled/spitted on LMs, relations of encirclement with contact and partial inclusion. The ambiguity of these relations, as well as apparent differences in interpretation of items within each subset led to inconclusive results, which certainly leave room for further analysis.

Furthermore, simultaneously focusing both on prepositions and other elements that carry spatial meaning has proven to be challenging. There are a few ways in which this problem can be surpassed in the future:

1) Testing the meaning of spatial prepositions and other spatial expressions separately, i.e. choosing either one or the other. In this case, the participants would either answer a question similar to that used in this study (*'Where is (xy)?'*) (focused specifically on prepositions) or answer a question that allows for more variety in answers (*'Could you, please, describe this picture?'*) (focus on locative expressions in general, more appropriate for analysis of distributed spatial semantics)
2) Alternatively, the participants could be asked to locate the TR in one of the tasks, and then be presented with various descriptions of the pictures (e.g. *'The stick pierced the apple.'; 'The stick is passing through the apple'; 'The stick is in the*

*apple'; The apple is on the stick'* etc.) and asked to choose the most appropriate description, or rank them from the most to the least appropriate.

Whichever approach one wishes to choose (and even if one was only to replicate this study with a larger number of participants and more elicitation materials), asking the participants *why* they chose to encode a relation with a specific spatial expression may provide valuable insights into spatial conceptualisation. It would help us understand what drives the speakers to use a specific expression, or choose one spatial expression over another.

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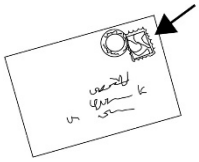
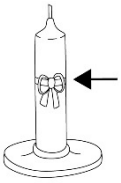
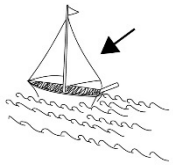
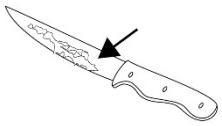
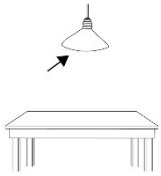
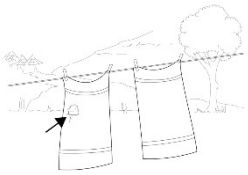
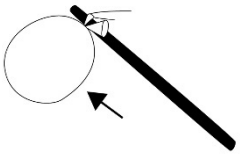
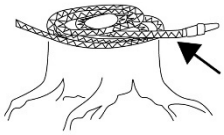
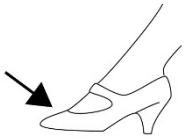
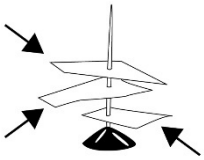
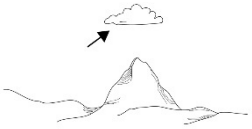
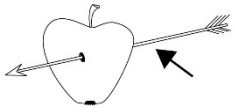
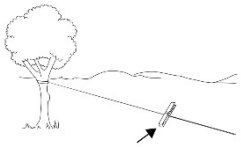
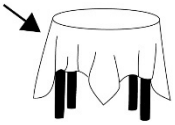
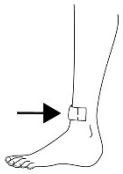
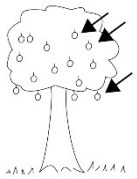
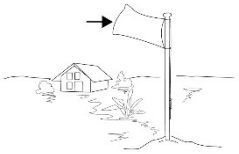
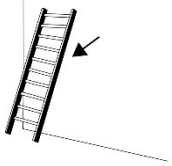
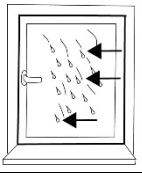
## Appendix

## Instrument

| | | | |
|---|---|---|---|
| Item 1 – stamp on an envelope  | Item 2 – bow on a candle  | Item 3 – boat on the sea  | Item 4 – butter on a knife  |
| Item 5 – lamp above a table  | Item 6 – hole in a towel  | Item 7 – balloon on a stick  | Item 8 – hose on a stump  |
| Item 9 – shoe on a foot  | Item 10 – papers on a needle  | Item 11 – crack in a mug  | Item 12 – cloud above a mountain  |
| Item 13 – arrow in an apple  | Item 14 – clothespin on a clothesline  | Item 15 – hose around a stump  | Item 16 – tablecloth on a table  |
| Item 17 – Band-aid on a leg  | Item 18 – hose over a stump  | Item 19 – apples on a tree  | Item 20 – flag on a flagpole  |
| Item 21 – ladder leaned against a wall  | Item 22 – cork in a bottle  | Item 23 – house inside a fence  | Item 24 – raindrops on a window  |

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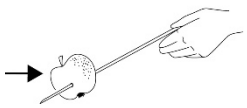
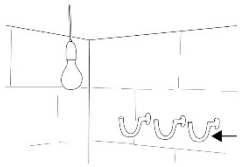
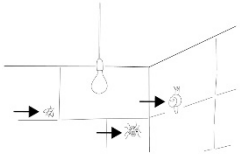
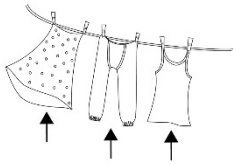
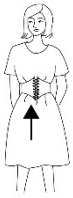
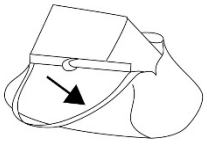
|---|---|---|---|
| Item 25 – apple on a stick  | Item 26 – hooks on a wall  | Item 27 – bugs on walls  | Item 28 – clothes on a clothesline  |
| Item 29 – corset around a woman's waist  | Item 30 – earring in an ear  | Item 31 – fence around a house  | Item 32 – handle on a bag  |