Some fundamental issues in the semantic analysis of prepositions[1]

Carmen GUARDDON ANELO

Universidad Nacional de Educación a Distancia
Edificio de Humanidades (UNED)
anelo@flog.uned.es

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ABSTRACT
This first part of this paper offers an evaluation of several semantic analyses of prepositions. The interest of these lexical items resides in the fact that they are highly polysemous. Therefore, I focus on how the analyses considered treat the question of prepositional polysemy. In the second part of the paper, I demonstrate by highlighting different facts about the semantics of prepositions that monosemic accounts fail to expose the linguistic, if not cognitive, reality of prepositions. My purpose is to show that prepositions, being closed-class lexical items, manifest lexical intrinsic properties that are revealed at different levels of analysis. Thus, monosemic and polysemic approaches should be reconciled into a single account because they both help to shed some light on linguists' major concern about the meaning of prepositions, which is their ability to categorise multiple situations within the physical realm and categorise in a variety of domains.

Key words: monosemy, polysemy, prepositional networks, category representation.

Algunas cuestiones fundamentales en el análisis de las preposiciones

RESUMEN
La primera parte de este artículo ofrece una evaluación de diferentes análisis semánticos sobre preposiciones. El interés de estos elementos léxicos reside en el hecho de que son altamente polisémicos. Por lo tanto, nos centraremos en cómo los análisis considerados tratan el asunto de la polisemia preposicional. En la segunda parte del artículo, al subrayar distintas cuestiones relacionadas con la semántica preposicional, demostramos que las explicaciones monosémicas no tienen en cuenta la realidad lingüística, y mucho menos cognitiva, de las preposiciones. Nuestro objetivo es mostrar que las preposiciones, siendo elementos léxicos de clase cerrada, manifiestan propiedades semánticas intrínsecas que se revelan en diferentes niveles de análisis. De esta manera, los enfoques monosémicos y polisémicos deberían conciliarse en una perspectiva de trabajo única ya que ambos ayudan a esclarecer la cuestión más recalcitrante a la que los lingüistas se enfrentan en el estudio de las preposiciones, nos referimos a su habilidad de categorizar situaciones múltiples en el dominio espacial, además de en otros ámbitos.

Palabras clave: monosemia, polisemia, redes preposicionales, representación categorial.

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1. INTRODUCTION

The analysis of the semantics of prepositions forces the linguist to address three controversial issues. First, whether she should distinguish between an abstract general meaning and the distinct senses arising from the actual occurrences of prepositions in context. The abstract meaning is an idealisation that allegedly applies to all the prepositional senses. The second question to be taken into account is whether the linguist should posit a primary sense from which the other senses derive via a set of lexical operations. Third, the linguist should be able to discern how much meaning is encoded by the preposition and how much meaning is provided by the context. Even though considerable work on prepositional meaning has been conducted within the framework of cognitive linguistics these issues continue to be unsettled. In the next section, I will review how previous approaches have dealt with these questions. Then, I will try to explain why these treatments have only achieved their purpose partially, which is the main objective of the current paper. I will also argue that a significant problem with previous studies is that most fail to place within their scope the non-physical usage of prepositions (Cooper, 1968; Hawkins, 1984; Herskovits, 1982, 1986; Regier 1992, 1996; Vandeloise, 1984). So the question remains if their methodologies could be adapted to a more comprehensive study of prepositional semantics. In my view, the establishment of the category structure of such polysemous items is not complete if all the domains in which they operate are not taken into consideration. If one attempts to settle only the semantic characteristics of the spatio-physical usage of a preposition they should explicitly state this fact. Most linguists engaged in the examination of the spatio-physical uses of a preposition, when reaching a conclusion, by default, they attribute it to the category as a whole. It is surprising to observe that despite the remarkable interest for metaphoric conceptualisation within the framework of cognitive linguistics, the abstract uses of prepositions has only received peripheral attention (cf. Brugman and Lakoff 1988).

Although, most of the semantic treatments reviewed arise from the cognitive linguistics postulates, some which belong to other disciplines will also be considered, because they have been highly influential on cognitive semantic analyses of prepositions. Specifically, I highlight the work of the structuralist Bennet (1975) on the temporal and spatial uses of prepositions and Boggess' (1978) computational study of prepositions.

2. THE MONOSEMIC APPROACHES

From a monosemic view, each lexical item is associated with a single highly abstract sense. The monosemic approach to prepositional semantics par excellence

is Bennet's *Spatial and Temporal Uses of English Prepositions* (1975). His account deserves special attention because he is the only scholar, to my knowledge, who attempts to deal with the temporal uses of prepositions in a systematic way. Dirven (1993) has also dealt with non-spatial uses of prepositions; however, his analysis aimed at explaining how concepts built up in mental space were motivated by the categorisation effected by prepositions in the spatio-physical world. Dirven made no attempt to classify the abstract uses of the prepositions that he studied; instead he associated certain concepts to these prepositions and explained how they are categorised differently according to the semantic content of each preposition. It must be noted that the relevant fact about his work is that, for the first time, he established different levels of abstraction in a continuum in which we find space, then time and finally the rest of abstract relations that prepositions set up.

Bennet's work focuses on the analysis of the spatial and temporal uses of several English prepositions; he pays particular attention to the prepositions *in*, *on* and *at*. Bennet strongly suggests that each preposition has a single core sense and further semantic denotations are derived from the contexts where they occur. His analysis stands in stark contrast to the work others have carried out within the cognitive linguistic framework, since for Bennet prepositions do not necessarily have a spatial origin[2]. They are relational elements that acquire a spatial or temporal meaning from their integration with the sentence content. According to Bennet, prepositions are *locative*, and location is not a notion to be associated with a specific domain. Although it may seem too extreme, this idea presents the advantage of being connected with the topological view of meaning, with its "capacity" to adapt itself to different contexts (Bernárdez 1995).

In my view, the main strength of Bennet's analysis is that it has been able to establish a sufficiently abstract sense as to be compatible with all the realisations of these prepositions. However, he fails to take into account the fact that some prepositional meanings have a privileged status, as findings in language acquisition show. For instance, children learn to use prepositions by referring to relations in the spatio-physical domain. I believe this is tacitly implied in his study, as he focuses on the spatial and temporal uses of prepositions; thus, Bennet is implicitly acknowledging the relevance of these domains. In effect, as noted above most analyses of English prepositions deal with the spatial domain, which is quite significant.

The second analysis considered here is that of Herskovits (1986). Her study of the English prepositions *in*, *on* and *at* is most probably the most cited work in the literature on spatial cognition. This work belongs to this section only in part, because she recognises the existence of a considerable number of uses regarding the topological prepositions that she examines. However, one of the most consequential aspects of her analysis is the attribution of one single ideal meaning to each preposition. This ideal meaning is equivalent to a geometric abstraction and according to Herskovits it applies to all the uses proposed by her within a certain degree of

[2] However, it must be noted that the postulation of the spatial origin of the prepositions is previous to cognitive linguistic analyses, Brøndal in 1950 already stated the primacy of this domain.

tolerance. In her account, this geometric meaning acts as unifier to all the specific senses of a preposition. These senses would be derived from the geometric meaning via lexical operations such as metonymy, or pragmatic knowledge. One of the weaknesses of Herskovits' work is its apparent lack of solid criteria to support the division into senses of prepositions. In this sense, Cienki affirmed: "The proliferation of Use Types she [Herskovits] gives for each preposition can be attributed to her criteria for differentiating the Use Types, which are rather sketchy" (Cienki 1989: 13). Even though all linguistic analysis is to a certain extent subjective, I agree with Tyler and Evans (2003: 104-6) in that several types of linguistic evidence must be relied upon before deciding which sense must be labeled as distinct.

3. THE PRIMARY SENSE APPROACH

In this section I include two approaches that hold as one of their most distinguishing tenets that prepositional polysemy evolves from a primary sense. The first is Vandeloise's (1984) work on French prepositions and the second is Tyler and Evans's (2003) revision of Brugman and Lakoff's (1988) study of the preposition *over*. For Vandeloise there is a clear diachronic component in the organisation of a polysemous category. Vandeloise is successful in associating the original meaning of a preposition with their present state in modern French through the notion of *impulsion*. This notion reflects some of the main positions of Vandeloise concerning semantic analysis. First, the search for unicity should underlie the work of a semanticist: "Since the purpose of a description is to collect a maximum number of usages and to group them in more and more general categories, unicity is without any doubt the biggest challenge proposed to the analysis" (Vandeloise 1984: 21). Second, the meaning of a word evolves from simple to complex in a process that he terms *logical time*, which in general runs parallel to historical time although there may be occasions on which they do not coincide. One of the factors that make Vandeloise's model feasible is that the prepositions are closed-class morphemes and have only a structural function. The primary role of this function is to establish the relation between two entities in the spatio-physical realm. This relation is grounded in relative aspects, i.e. it depends on the perspective the speaker takes of a certain scene (Levinson 2002; Talmy 2000). But the speaker's perception of space is not likely to suffer much variation across different periods for this reason: in most cases, their number does not increase or diminish. This distinguishes prepositions from other grammatical classes that have a direct referent such as nouns. In particular, when they refer to objects or artefacts their references and the function they fulfil are supposed to change over time.

Years later, Vandeloise, perhaps overwhelmed by the successful establishment of geometric idealisations as assessment criteria in most cognitive accounts of prepositional meaning, makes the following objection:

> [T]he dimensionality of the object is often only a superficial consequence of the preposition itself, and not an essential characteristic of the use of the preposition. Seductive geometric generalizations, often based on simplified analyses, hide the true nature of the prepositions they attempt to explain (Vandeloise 1991: 7).

For this scholar, geometric idealisations can only provide a partial account of the controversial issue of prepositional usage. In particular, Vandeloise is very critical of linguists' tendency to associate certain prepositions with dimensions. For instance, the preposition *in* is often connected with enclosure in a three-dimensional environment, and the preposition *on* with support on a two-dimensional entity. The point that he makes is that the considerable number of exceptions that arise forces the linguist to introduce further dimensions in relation to a specific preposition, which limits the usefulness of the model. As an alternative, Vandeloise argues that in the analysis of prepositions more emphasis should be placed on functional factors. This view is implemented in his analysis of French prepositions (1984, 1991) and in his study of the English topological preposition *in* (1994).

Tyler and Evans (2003) propose an alternative to Brugman and Lakoff's (1988) analysis of the category *over*. For them, this analysis is too unconstrained to consider that all the alleged senses of *over* are really stored in the speakers' memory. According to Tyler and Evans, in order to minimise subjectivity one has to establish a solid methodology, first, for defining the primary sense of the category and, second, for determining to what extent a sense can be actually considered a sense of a preposition. Tyler and Evans argue that Brugman and Lakoff's model is too fine-grained and multiplies senses, the status of some of which is set into question by these linguists. The strategy allowing them to reduce the number of senses of *over* in their model is their distinction between constructed on-line meaning of prepositions and senses. Therefore, they place great importance on sentence compositional processes and in this sense they connect with Bennet's work (1975).

Tyler and Evans propose the existence of a protoscene. The protoscene is an abstraction from rich real-world scenarios that can be categorised by the primary sense of *over*. It is represented by a schematic trajector and landmark.[3] The trajector is above the landmark but within an area of potential contact with this landmark (Figure 1). It must be noted that the protoscene posited for *over* is schematic for static and dynamic relations.

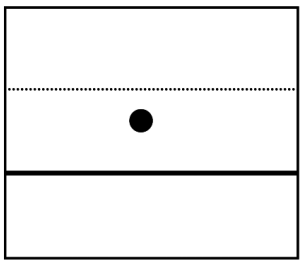

Fig. 1. The protoscene for *over* (Tyler and Evans 2003:111)

[3] These notions involve perceptual features that are pivotal to the conceptualisation of spatial relations. The trajector is movable and of small size, when compared to the landmark, whose position is stable and is larger. The trajector is the thing whose location is specified. On the other hand, the landmark constitutes an excellent reference, it is the background against which to locate the trajector, which receives the higher focus of attention.

Even though graphically it reminds one of Johnson's (1987) image-schemata, the authors do not attribute to this construct any role in mental representations. Because of its abstract nature and its role in motivating all the senses of *over*, Tyler and Evans' protoscene can be compared to Herskovits' (1986) ideal meaning. However, while Herskovits does not explain how the ideal meaning of the preposition motivates the senses that she assigns to them, Tyler and Evans provide a network of senses and several schematic representations that show how all senses are directly or indirectly motivated by the protoscene.

Tyler and Evans also deal with the metaphorical senses of *over* and this leads to one of the most innovative aspects of their work. In their view, the metaphorical senses of this preposition are derived from some functional aspects that they ascribe to the protoscene or to some attested physical senses of *over*. For example, an expression such as *A feeling of dread hung over the crowd* shows the functional aspect *influence* or *control* that they assign to the protoscene. The physical proximity that holds between the trajector and the landmark standing in a relationship categorised by *over* distinguishes these relations from those categorised by the preposition *above*. When an object is close to another it is, according to Tyler and Evans, within its sphere of influence. This is enhanced by the trajector being in a higher position. Position in a higher place is another spatial relation connected with control. The explanation of abstract senses in terms of functional notions derived from physical relations is elegant and, I believe, can help to solve the thorny problem of the metaphorical uses of prepositions. However, I do not think that it should be placed at the protoscene level since it displays a high level of abstraction far from real scenarios. Besides, the protoscene has to account for spatial relations that do not show a relation of power or control, for instance *The plane flew over Madrid*.

A further objection that I would make to this approach is that Tyler and Evans affirm that all prepositions are static, dynamism being a result of context and sentence meaning. For them the dynamic senses of prepositions result from what they term *complex conceptualisation*. This operation takes place when constructing a scene from a spatial expression. In my view, dynamic aspects of prepositions are often part of their selection restrictions and, therefore, determine the compatibility or incompatibility of their collocation with other sentence elements such as verbs. For example, the presence of a dynamic component in the semantic content of the Spanish preposition *desde* 'from' separates this preposition from *de* 'of, from', and it precludes its collocation with static verbs such as *ser* 'to be' (**Soy desde Madrid* 'I am from Madrid'), while this collocation is acceptable with the preposition *de* (*Soy de Madrid* 'I am from Madrid').

4. THE MULTIPLE-SENSE APPROACH

In this section I will examine two models; the well-known analysis of the preposition *over* carried out by Brugman and Lakoff (1988) and the analysis of the preposition *around* proposed by Hawkins (1984). Again the epigraph of this

section is only partially true. In the structure of the category of *over* proposed by Brugman and Lakoff (1988) there exists a central sense to which additional senses are associated by means of cognitive operations that Brugman and Lakoff designate *similarity* and *transformational links*. However, these scholars do not place so much emphasis on the function of that central sense in the generation of the whole category; rather they are interested in highlighting all the senses that the category displays as a consequence of the links mentioned above. Their different positions in relation to the role of the main sense attributed to the category is implicitly reflected in the terms these scholars use to refer to it. Thus, Tyler and Evans name it *primary sense* and Brugman and Lakoff call it *central sense*. To begin with, Brugman and Lakoff assign a dynamic component to the central sense which makes it incompatible with all the stative uses of *over*. In fact, because of its high level of specificity, their central sense shows remarkable parallelisms with the prototype category. Moreover, in opposition to Tyler and Evans, Brugman and Lakoff assign a lesser role to sentential semantic content when attempting to establish the senses of the preposition *over*. This is one factor contributing to multiply the number of senses of *over*. At any rate, it should be borne in mind that the mainstay of this work is Brugman's (1981) MA *Story of Over* in which she stated that it is absolutely impossible to find a core sense of *over*.

Brugman and Lakoff also deal with the metaphoric extensions of the spatial senses of *over*. They connect these metaphorical senses with the cognitive metaphors identified by Lakoff and Johnson (1980). Thus, examples in which *over* denotes control are an instance of the general metaphor CONTROL IS UP. Consistently with the high level of specificity with which they treat the uses of *over* in the physical domain, they describe some metaphorical expressions encoded by *over* by alluding to the corresponding schema and one or more cognitive metaphors. Brugman and Lakoff deal with each example of metaphoric categorisation individually. These examples are well-known cases of the non-spatial usage of *over*. As a result, whereas Tyler and Evans' account of *over* provides a more thorough discussion of its metaphoric uses, Brugman and Lakoff fail to provide a classification and simply comment on some key examples.

Concerning Hawkins (1984), he agrees with Brugman (1981) concerning the difficulties that the search for a core sense posits in the study of prepositional categories. Hawkins put forward a method for establishing when a sense is distinct and, hence, putatively instantiated in semantic memory. In particular, he looks at three basic components of a spatial relationship: the trajector configuration, the landmark configuration and the relation profiled by the preposition. Differences in any of these components will yield a different sense. Hawkins posits nine senses for the preposition *around* as they are established on the grounds of the visual configuration of the trajector and the landmark and their organisation by the preposition. Instead of defining them propositionally, he represents these nine senses by means of schematic drawings. These schemata do not make any serious claim for meaning representation, they simply constitute an abstraction of the myriad of scenes that each of the senses of *around* can specify. They are rated from

1 to 9 according to their degree of prototypicality; $AROUND_1$ and $AROUND_2$ constitute the central senses of the category and both, according to Hawkins, have the same status. The other seven senses constitute the rest of the continuum from clear cases of *around* to more controversial senses. When two or more senses are perceptively similar, this similarity leads to the abstraction of a schema. For example consider the representations of $AROUND_1$ and $AROUND_2$ as Hawkins established them:

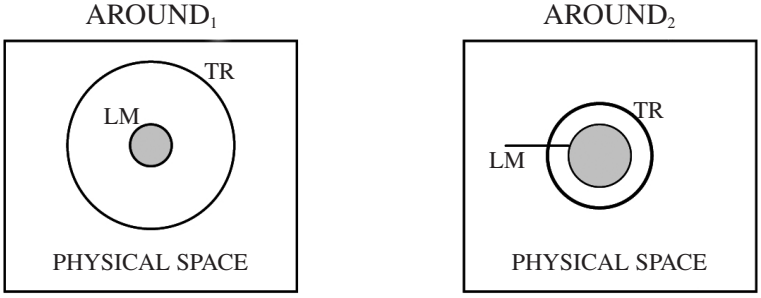

Fig. 1. The prototypical senses of around as established by Hawkins (1984: 239).

As Figure 1 shows, both senses are identical when it comes to landmark and trajector configuration. They only differ in the basic relation they profile, while in $AROUND_1$ there exists a radial separation between the trajector and the landmark, in $AROUND_2$ the preposition profiles a relation of radial coincidence. Both senses show the same landmark configuration, *indeterminate* in Hawkins' terms, and the same trajector configuration, *circular path,* also in his terms. Therefore, a schema comprising both senses should be: "schematic for the radial SEPARATION of $AROUND_1$ and the radial COINCIDENCE of $AROUND_2$" (Hawkins 1984). This schema is represented by Hawkins with a superscript which indicates the number for elements for which it is schematic: $AROUND^1_{1\text{-}2}$. Hawkins also proposes the existence of superordinate schemata subsuming other schemata. These schemata must show a further level of abstraction, i.e. they are schematic for two elements. For instance, there is a schema subsuming the senses seven and eight: $AROUND^1_{7\text{-}8}$. These senses profile a trajector configuration that, according to Hawkins, can be schematised as multidimensional extension. A schema can comprise the two schemata exposed above: $AROUND^2_{1\text{-}2\text{-}7\text{-}8}$. The number two in the superscript indicates that this schema is schematic for two elements. First, for trajector configuration which is the principal source of contrast, $AROUND_7$ and $AROUND_8$ do not highlight *circular path*, but *space* and *area* respectively. Second, these senses also profile a radial relation, but, it is not clear whether it is SEPARATION or COINCIDENCE. In this fashion, Hawkins establishes a set of schemata that successively become more abstract subsuming not only senses but other schemata. However, they never show three levels of schematicity because, this linguist states,

they would be too abstract to be meaningful. It is worth noting that the study of Hawkins differs from the others in that the senses are not established more or less intuitively from specific expressions but are motivated by a previous taxonomy of trajector and landmark configurations. This endows his analysis with a great deal of systematicity. Furthermore, establishing a major weight on the trajector and landmark configurations determines his general assumptions about the polysemy of prepositions: "Polysemy is recognized in any case in which a preposition exhibits contrasting predicates, i.e. contrasting profile/base structures, regardless of whether the contrast might be attributable to the effects of the immediate linguistic environment" (Hawkins 1984, 179). This assumption makes him stand in stark contrast with Tyler and Evans (2003), who deny any responsibility to contextual differences in constituting distinct senses. It also contrasts with Brugman and Lakoff's (1988) views, in that these scholars do not recognise any role to context either, despite the multiple senses that they assign to *over*.

5. DIFFERENT LEVELS IN THE SEMANTIC ANALYSIS OF PREPOSITIONS

I have claimed that analysis in prepositional semantics presents crucial problems. First, it seems that linguists are not able to reach an agreement concerning the feasibility of positing one single general meaning for all the senses of a preposition. Multiple-sense approaches appear to be in a secure position, after establishing a central sense that would more or less indirectly act as a partial initiator of the category they establish a description of all the additional senses of the preposition on the grounds of the different landmarks with which they occur. The central sense or senses suggested in these analyses show a level of specificity that place this sense in the role of a prototype (Brugman and Lakoff 1988; Hawkins 1984). Also on safe footing are approaches located on the other pole of the continuum. For instance, Bennet's core sense approach which, by setting all the responsibility for polysemy in the sentential context, makes no major claims about the internal structure of the category, evolutionary patterns, etc. The contrast between these methods is to be paralleled with the dichotomy between the minimalist and maximalist approaches to polysemy. The present approach to the study of prepositional meaning would partake of its main tenets from these two views of lexical mental representation. While I share the minimalists' perspective that the specific senses of a word are ultimately determined by the context, I believe with the maximalists that the speakers who have witnessed the recurrence of a particular word in a number of contexts extrapolate different senses by the effects of sentential meaning. These senses must be somehow listed or segmented in the speakers' memories. Otherwise, lexical disambiguation in the special acontextual instance of a preposition would not be possible.

Like other grammatical classes, such as nouns, all prepositions do not have all the same properties. For instance, there are pure topological prepositions such as *in*,

on and *at*; but there are also topological prepositions which, involve the vertical absolute dimension such as *under*. The compound prepositions *in front of* or *on the left*/*right of* must be defined in terms of angular or coordinate information. Furthermore, contrary to what Tyler and Evans (2003) state, I claim that there are intrinsically dynamic prepositions. In other words, no static schema should be attributable to prepositions such as *through*, *around* or *into*. The fact is that one of the main tasks of prepositions is to express basic spatial relations and these mirror the way in which speakers interact with the world they inhabit, i.e. participating in static relations with other physical entities and navigating with or without a fixed goal in their environment. This implies that prepositions exhibit different degrees of semantic complexity. This is in addition to the obvious disparities between prepositional usage in different languages. Therefore, the problem is that most authors make generalizations about the monosemic or polysemic nature of prepositions from their findings concerning one or a restricted number of prepositions. For example, to posit one abstract meaning that applies to all the senses of a preposition is a harder task for prepositions like *over*, which presents static and dynamic uses, than for the topological preposition *at* that does not profile any particular trajector configuration.

Topological notions do not take into consideration spatial features that are relevant in Euclidean geometry. For instance, topologically a sphere and a cube are identical as only the deformation of the original shape of the sphere must hold to obtain a cube; if we manipulated the cube further into a flat two-dimensional circle we would still have the same topological shape. But if we opened a hole in that circle so that we obtained a kind of torus, topologically, it would not be the same figure since it is the result of perforating that circle. The coarse distinctions encoded by topological prepositions, which are inherently static, motivates the recurrent association of these prepositions with a single general meaning.

However, I believe that little emphasis should be placed on finding out whether the right analysis should posit one single abstract meaning or identify as many senses as possible. These strategies reflect different levels of category organisation and should not be regarded as incompatible; rather they are complementary and both help to shed some light on the semantic content of the prepositions at issue. Therefore, I agree with Vandeloise (1984) that unicity is the major challenge a linguist has to face. But, at the same time, sentence compositional processes play a fundamental role in determining the usage of a lexical item. Therefore, I insist that both levels of analysis are necessary in a semantic account of prepositions since they both reveal varying degrees of specificity in spatial representations.

Let us now turn to the crucial problem of a great deal of prepositional analyses in particular within the framework of cognitive semantics. As Sandra and Rice (1995) explained in their article "Network analyses of prepositional meaning: mirroring whose mind-the linguist's or the language user's", semantic accounts of prepositions do not have to make serious claims of conceptual organisation. In other words, the prepositional senses that linguists identify do not necessarily have counterparts in the speaker's conception of a linguistic category. For instance, I administered a test to 30 undergraduate students of Cincinnati University (Ohio) that shows that we cannot attribute to this closed-class morphemes properties that

are typical to other grammatical classes such as nouns. For instance, when it comes to lexical categories that have direct referents in the world such as nouns that denote animals or artefacts, speakers easily establish hierarchies of best exemplars (cf. Rosch *et al*. 1976). But our subjects were confronted with *eight* sentences expressing different uses of the preposition *in* (location in a prototypical container, location in a country, temporal uses, and other abstract uses). They were asked to order them placing the best representative of the category *in* in the first place and subsequently adding the others. Four of the 30 informants did not order them and wrote that all of them were the same. Only 10 placed in the first position a case of location in a three-dimensional container, which, the literature agrees, is the prototypical use of the preposition. Eight chose an example that referred to geographic location (*in Germany*). Surprisingly, two pointed to the temporal use of the preposition (*in December*) to occupy the first position in the ranking. The other 6 picked up other examples of enclosure as the best representative of the category: *in the rain* (4), *in a book* (1), *in heaven* (1). It is worth noting that none of them thought that the metaphoric expressions *in trouble* or *in love* were the best representatives of the category.

The results of the test lead one to conclude that speakers do not have as clear an idea of what the best member of a spatial relational category is, as they have of the best member of the category BIRD. In the same fashion, they may not be aware of the preposition *in* displaying various uses as they are of there being different types of birds. However, linguists still can hypothesise about the organisation of the conceptual structure and spatial representations from what the linguistic categories reveal studied in the context where they occur (Jackendoff 1996). For instance, the commonalties of these contexts manifest what is salient in some situations, so that they qualify to be placed into a certain category. Whether they are termed senses or something else should not blunt the validity of the analysis as far as their establishment is supported by solid criteria that takes into account relevant data and cognitive principles.

6. THE ROLE OF MODALITIES IN THE CONCEPTUALISATION OF PREPOSITIONS

According to the frame of reference that defines the use of a preposition we have trajectors and landmarks treated with varying degrees of specificity, when it comes to their configuration. For instance, projective prepositions such as *behind* or *in front of* refer to relationships which must be checked against visual input. First, the landmark may have intrinsic back and front, in this case a simple schematic image would be computationally non-efficacious because if the speaker cannot resort to enough visual information she would fail to distinguish the back from the front or vice versa. Second, the landmark may not have intrinsic back and front. Then the speaker becomes the deictic centre and the front of the landmark would be that facing the speaker. In this case, the speaker is immersed in the scene he is describing

and is drawing upon the visual information that she obtains from her own position with respect to other objects to build up a certain conceptualisation of the scene. *Over* involves the vertical absolute dimension and other intrinsic features, or axial properties of landmarks. In order to assess that an entity is *over* another the speaker must also have visual access to a scene. To be able to state that a trajector is moving over a given landmark, the trajector must be conceptualised as a point standing at a certain distance on an axis perpendicular to the main horizontal axis of the landmark. The motion of the trajector must take place following that horizontal axis for the relationship to qualify as a case of *over*. It is obvious that the spatial features that are recruited for the spatial relationship are those which are relevant to the categorisation effected by the preposition. In other words, rich experience is abstracted away.

Although simple topological prepositions such as *in*, *on* and *at* do not need specific frames of reference, some spatial features must be included in a description of some of their uses. For example, the English prototype *on* requires that the trajector rests on a free, horizontal, upward facing surface of the landmark. Furthermore, a central component in the definition of the preposition *on* is that of *support*. In short, the weight the trajector applies on the landmark and, therefore, the notions of exertion and resistance to force are also involved in the usage of this preposition. These notions are learned through visual experience and in order to evaluate that a relation of support exists one must have access to visual data and bodily experience.

However, not all the prepositions commit to specific trajector and landmark configurations and to specific angular or coordinate information. In fact, speakers are able to express relationships that they have never seen. This is not a miraculous assumption, it is associated with the basic representation of these relations: maps. Maps are abstractions of relationships that the speakers cannot apprehend visually, usually due to the large extension of the landmark. Maps reflect the features that are relevant to the situations that they represent. For example, when indicating on a map where a terrorist attack has taken place in a country, a point standing for the event is drawn on the approximate area of the bounded plane representing the country. One's increasing familiarity with maps has determined the usage of some prepositions, and also modified the mental representations that speakers have of certain geographic locations such as countries (Boggess 1978; Lindkvist 1978). For instance, speakers of Swahili who had only a relatively recent contact with maps, do not use spatial morphemes denoting enclosure within limits to express location in a country (Guarddon 1999).[4] Determining what type of spatial relationships were primarily encoded by prepositions appears to be a difficult issue. On the one hand, there are diachronic studies of prepositions which state that the visual uses of prepositions, those in which the preposition collocates with small landmarks, seem to be the core of the category (Lundskær-Nielsen 1993). On the other hand, O'Keefe

[4] In the same fashion, in Middle English the preposition *at* was also used to express location in a country (Lindkvist 1978).

(1996) hypothesises that the first spatial morphemes occurred as a consequence of hominids associating certain grunts with some rough representations made on sand or dirt in order to describe where food had been found to other members of their community. At any rate, one question seems to be clear, the use of prepositions to express idealised spatial relations is motivated by the pervasive cognitive function of abstracting spatial information into schematic representations. In English, the topological prepositions *in*, and *on* participate in a great number of relationships derived from cognitive maps. Consider the following examples:

(1) a. *Mount Everest is in Asia*
b. *There is a furniture factory on the road to Las Vegas*

Obviously, the prepositions in the expressions above do not display the features usually associated to them, such as enclosure within a three-dimensional entity in the case of the preposition *in* and contact with a two-dimensional surface with the concurrence of support, as it is assigned to the preposition *on*. One of the factors that separates Bennet (1975) from most cognitive linguists is his reluctance to ascribe geometric dimensions to the meaning of the prepositions. I agree on this point with Bennet when he argues that assigning a dimension to the meaning of a preposition does not yield a satisfactory account of all its senses and often further dimensions have to be added, which constrains the efficiency of the model. I still believe geometric dimensions constitute a useful device for defining certain uses of prepositions, however, the analysis should discern which senses each dimension applies to. Thus I cannot refer to the relationship in 1 a. as a case of location within a three-dimensional entity, since *Asia* is being conceptualised as a plane. Therefore, the analyses of prepositions do not appear to address the issue of the different modalities that participate in the conceptualisation of spatial relation, i.e. vision versus cognitive idealisations. In our view, this factor is determinant in establishing an accurate semantic description of prepositional meaning. Disregarding this question leads to artificial generalisations. For instance, Herskovits (1986) defines the meaning of the preposition *at* as "coincidence at a point". According to this linguist, with a certain degree of tolerance this meaning applies to all the distinct usage types that she identifies. One of these usage types is "person using artifact". But I claim that this use of the preposition *at* cannot be explained without recourse to functionality. In these cases, the trajector presents the feature [+HUMAN] and the landmark is an artifact that the trajector is using, i.e. *Mary is at her desk, John is at the piano; Eloise is at her computer*... The pivotal question in these expressions is that the relationship of physical coincidence that holds between the trajector and the landmark allows the first to use the second. However, this coincidence is not enough for that relationship to qualify as a case of *at*. If *John* happens to be sitting on the upper surface of the piano, the relationship between them would have to be encoded by a preposition other than *at* –most probably *on*. Even though Herskovits (1986: 82) claims that a spatial relation like *Maggie is at her desk* is viewed as coincidence between two points, it must be noted that the selection restrictions that determine the correct use of *at* in such a context, determine the distribution of *at*

versus *near* or of *at* versus *close to* in the same context. I believe these selection restrictions are too specific to be abstracted away in a geometric conceptualisation where the trajector as well as the landmark are viewed as points. Therefore, the need to introduce functional factors to account for some uses of the preposition *at* shows that a strong monosemic position regarding this preposition is untenable. In regards to how functional factors are associated with perceptual modalities, it is imperative to emphasise that these factors cannot be attested without visual access to a scene. This has consequences on the common representation of these scenes. For instance, when in an instruction manual a person is presented using her desk, rich details may be abstracted such as specific characteristics of the person, i.e. whether the person is male or female, the clothes they are wearing, etc. The desk most likely will be presented in a schematic way. However, the specific position of the person with respect to the desk, that which allows us to categorise the situation as that of somebody using a desk, will not be represented by points, planes or other geometric devices, and certainly neither will the trajector nor the landmark.

7. CONCLUDING REMARKS

I conclude this paper taking into consideration the controversial issues of prepositional semantics discussed in the body of the article. Regarding the question of whether it is possible to posit a single schematic sense for all uses, there exist as noted earlier a number of factors that preclude a monosemic analysis from being realistic. For instance, the fact that some prepositions have static and dynamic senses, or the impossibility of defining topological prepositions in terms of a single dimensional meaning as a consequence of the different modalities intervening in the conceptualisation of the relations that they encode. Probably, a cross-linguistic analysis of spatial morphemes would yield cases of lexical items that can be defined in terms of a single abstract meaning. But this conclusion should be reached after the thorough examination of data and not as a result of the linguists' own introspective judgements about the category at issue (Sandra & Rice 1995). The second controversial point is the question of establishing a prototype from which all other senses derive via some lexical operations. I claim that an attempt to establish the historical evolution of the category would need a diachronic study of prepositional usage in order to verify the temporal order in which these particular uses occurred. A synchronic examination of the attested senses of a category could help to hypothesise some directions in meaning extension, as most linguists appear to agree that from the core or prototype other related senses radiate. There is no doubt that this method possesses a high heuristic value, however major claims about the origin of the category should be subject to verification.[5] The third relevant

[5] Even a diachronic examination of the prepositional usages in relevant texts will not allow to make serious claims about the primary sense of a category, because by the time the first extant documents were written several senses of a preposition are already solidly established.

question is the role of sentential context in the semantics of prepositions. As we have seen here, monosemic analyses do not attribute to the preposition any responsibility in the selection of the context in which they occur. At any rate the sentential context where prepositions occur is not random, otherwise I would not be able to explain the restricted distribution presented by some pairs or groups of prepositions, i.e. *above* and *over*, or *in*, *on* and *at*. This indicates that prepositions establish strong selection restrictions that allows a speaker to judge certain collocations as ungrammatical.

Finally, focusing on the main purpose of our paper, I will summarise the aspects that must be taken into account to avoid methodological vagueness. First, the two main modes of the speakers' interaction with the spatio-physical world they inhabit are motion and static position. These two aspects are so basic that some authors claim that they are represented in the neurological architecture of our mind (Jackendoff 1996). Therefore, this distinction should not be placed in a peripheral position by subsuming them under a single schematic meaning or schema. Second, some of the features that often are ascribed to some prepositions derive from relatively rich scenes that are accessed visually. These relationships should be clearly differentiated from those which are idealised and manifest a higher degree of schematisation. Third, I claim that prepositional semantics should reconcile both the monosemists, who seek to posit a single abstract meaning to cover all the uses of a given preposition and the polysemists, who posit multiple meanings that bear relations among themselves as it is represented in their networks. Both levels of analysis echo the complexity of prepositional semantics and helps to capture the linguistic, if not cognitive, reality of prepositions. However, they should rest on solid methodological criteria that depends on the specific semantic content of the preposition under scrutiny.

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