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CHAPTER IV

The Linguistic and Cognitive Relevance of Prepositions

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ABSTRACT

Linguists have always been aware that prepositions form a separate part of speech that differs from the other parts of speech, but have never found an agreement on a common definition of prepositions. As explained by Ceccato and Zonta (1980), much of this impasse in defining prepositions, as well as more in general the other parts of speech, originates from adopting, as an analytical tool, linguistic and objectivist semantic notions that are defined in circular terms. In order to avoid the inconsistencies and circularities brought about by linguistic and objectivist semantic notions, non-linguistic and non-objectivist semantic notions must be adopted. Following and developing Ceccato's original research program (Operational Linguistics), I have adopted a set of cognitive operations (CO) as the analytical tool to analyze prepositions. The set of CO includes the operations performed by attention and by what I have defined as the self (Marchetti, 2018, 2022). Among the sub-systems of the self, the most relevant ones for the analysis of prepositions are working memory, long term memory and force dynamics. Thanks to this set of CO, it is possible to differentiate prepositions from the other parts of speech and grammatical constructions that are functionally akin to prepositions (conjunctions, relative pronouns, noun-adjective phrases and the subject-predicate construction, etc.). Prepositions are accordingly defined as relational tools that produce a prepositional assembling (PA) of the X*prep*Z type by making Z determine X according to the specific instructions provided by each preposition.

Keywords: Prepositions; Cognitive Operations; Attention; The Self; Prepositional Assembling; Relators.

1. INTRODUCTION

Many grammarians and linguists, being aware that prepositions share a common linguistic function that differs from the functions played by the other parts of speech, have classified them as a separate class. However, there has never been full agreement on what this function is, nor has a common definition of prepositions ever been given (Fagard, 2010; Mardale, 2009; Tremblay, 1999). The most shared opinion is that prepositions have a relational role. However, this also holds for conjunctions and other grammatical classes, which does not help to clearly isolate the class of

prepositions from the other classes. Moreover, there are cases in which the same morpheme (for example, “up”) can be used as either a preposition (“He climbs up a tree”) or an adverb (“He climbs up”). All this has even led some linguists (Jespersen, 1924; Pottier, 1962) to group prepositions, conjunctions and adverbs under the same class. Consequently, grammars can only provide descriptive rules without any sound explanation, such as when they classify, on a purely syntactical ground, “before” as a preposition if it is followed by an NP (“Bill left before the meeting”), and as a conjunction if it is followed by a subordinate clause (“Bill left before it began”) (Huddleston, 1984).

Therefore, one can legitimately question whether prepositions really share a common linguistic function that differentiates them from the other parts of speech, or whether instead they share none and consequently must be grouped together with other linguistic units in a wider class, such as the “closed” class (Talmy, 2000), on the basis of some other property.

The easiest way to answer this doubt is to compare prepositions with the other linguistic units. The most difficult problem, however, is which criterion to adopt in order to perform the comparison: if the wrong criterion is chosen, the comparison can reveal only superficial, inessential differences, or even no differences at all.

As Ceccato and Zonta (1980) explain (see also Marchetti and Marchetti P. C., 2021), much of the problems linguists encounter in defining and differentiating the parts of speech (Dixon and Aikhenvald, 2003; Haspelmath, 2001, 2007, 2011; Rijkhoff, 2007) originates from adopting, as the guiding criterion for analysis and classification, linguistic notions (such as word, morphology and syntax) and cognitivist and non-cognitivist objectivist semantic notions (such as event, action and property) (Lakoff, 1987) that are not defined in positive terms, that is, notions that are defined in a circular way: a given linguistic term (for example, verb phrase) is defined in terms of another linguistic term (verb), which in turn is negatively defined as something different from other linguistic terms (nouns, adjectives, prepositions, etc.). This lack of positive definition leads unavoidably to inconsistencies and circularities: differentiating parts of speech on a purely syntactic ground is possible only if one draws on semantic notions, but semantic notions, as they are defined by the objectivist tradition (Lakoff, 1987), are useless because, in turn, they are circularly defined (an action is negatively defined as something different from an object, and an object as something different from an action). Moreover, adopting purely linguistic notions also implies some other kinds of problems: for example, morphosyntactic criteria are not universally applicable because they vary from language to language.

As suggested by Ceccato and Zonta (1980), non-linguistic and non-objectivist semantic notions should be adopted to avoid these inconsistencies and circularities. In this view, Ceccato (1968, 1969, 1970, 1972, 1990; Ceccato and Zonta, 1980) proposes analyzing linguistic units in terms of mental operations – namely in terms of attentional states and combinations of attentional states (the combinations being supported by memory operations) – and classifying them (mainly but not only: Ceccato and Zonta, 1980: 98) based on the position they occupy in what he termed the “correlational network” (“rete correlazionale”).

Based on these criteria, Ceccato and Zonta identify two main classes: the class of "correlators" ("correlatori") and the class of "correlated elements" ("correlati"). Correlators are used to relate correlated elements, as well as correlational networks and correlators. Correlators include conjunctions, prepositions and the "category of maintenance" ("categoria o correlatore di mantenimento") (Ceccato and Zonta, 1980: 95), which underpins the noun-adjective phrase, the subject-predicate construction and the verb-direct object construction. The class of correlated elements can in turn be divided into some subclasses, according to their specific content: nouns, verbs, adjectives, adverbs, etc.

There is no doubt that Ceccato and Zonta's criteria allows most circularities and inconsistencies to be avoided. Nevertheless, I think that their classification also raises some legitimate doubts. Let's see why.

According to Ceccato and Zonta's (1980: 137) analysis, prepositions do not differ from conjunctions and both must be grouped in the same class of correlators which, as we have seen, also contains the "category of maintenance". As far as the "category of maintenance" is concerned, however, Ceccato and Zonta themselves cannot avoid acknowledging that it alone is not able to account for the various kinds of relations it underpins, and that some additional mental operation must be considered to account for them. For example, the verb-direct object construction is produced by "transferring the first correlated element on the second one" ("trasferire il primo correlato sul secondo"), while the subject-predicate construction is produced by "transferring the second correlated element on the first one" ("trasferire il secondo correlato sul primo") (Ceccato and Zonta 1980: 96).

This, in my view, is tantamount to admitting that the "category of maintenance" is like a basket containing different kinds of relators, and consequently that these different relators can in turn be grouped into different classes according to the specific way they assemble elements. Therefore, I wonder, if it is so for the "category of maintenance", why might it not be even more so for the whole class of "correlators"? Are there really no differences between prepositions and conjunctions? Or is this lack of differences an artifact caused by an intrinsic limit of their analytical tool, the correlational network, which is not sufficiently powerful to make finer distinctions?

As I have already highlighted (Marchetti, 2010), Ceccato's proposal suffers from not having duly considered in his model of thought (the correlational network) the propulsive, driving and pushing forward aspect of thought, that is, the fact that a correlation of elements (but even one single element) can produce, cause, recall, evoke, and summon up another element. This causes several drawbacks in his analyses, not least the fact that his model, although it can describe how two things can be combined, is not able to account for the (possible) results of the combination.

It is well known that when we mentally combine two (or more) elements (words, numbers, musical notes, etc.) by means of some relators (conjunction, arithmetic operator, tie, etc.), usually we obtain a new, different element that differs from both the individual elements we have combined and the relator we used to combine them: "5" is neither "3" nor "2" nor "+"; the meaning of "black hole" differs from both the meanings of "black", "hole" and what keeps them together. Moreover, the

product of the combination has its own properties that differ from the properties of the single elements that constitute it: a triangle has an area, whereas its three edges have none. Likewise, "glass with water" indicates something different from "glass", "water" and "with", which possesses some properties that neither "glass" nor "water" nor "with" alone possess (for example, "glass of water" implies a limited quantity of water – that is, the one afforded by the glass – whereas "water" alone does not provide any indication about the quantity involved).

In this perspective, in order to fully understand the role of prepositions in the process of thought, that is, how they contribute to shape and frame thought, and to be able to differentiate them from the other kinds of relators (conjunctions, adverbs, pronouns, etc.), it is essential to investigate how the way they assemble separate elements brings forth a new, composite element. This will eventually help clarify how they form new *meanings* ("glass with water") by combining separate, individual ones ("glass", "water").

This leads us to adopt a model of the mind that accounts for the *dynamicity* involved in the process of thought: a dynamicity which, incidentally, is involved not only when elements are combined or assembled, but also more in general when elements are transformed, summoned up, evoked, retrieved from memory, etc.

In my view, such a model must necessarily include the system that I have called the *self* (Marchetti, 2018, 2022 and forthcoming; in Marchetti, 2010, I termed it *the schema of self*), which *unconsciously processes the information provided by what the person has consciously experienced, and supports the production of new conscious experience*.

The self comprises our body and brain (excluding attention) and is primarily expressed via the central and peripheral nervous systems, which map our body, environment and interactions with the environment. The self embodies all the competencies and abilities (physical, social, linguistic, and so on) we innately possess and acquire during our life. It develops and is centered on a hierarchy of (biological, social, religious, etc.) values that define what is relevant and meaningful for us (Zlatev, 2002). What we consciously experience feeds and modifies the self, allowing us to continuously adapt and learn. In turn, all the inherited and acquired abilities and competencies regulate our physical and mental behavior, which is principally determined by the values inscribed in the self. Therefore, the self plays an essential role in supporting and directing the course of our actions and thoughts.

Among the various operations performed by the self, particularly relevant for the analysis of prepositions and relators in general are those that allow for mentally realizing or developing (and consequently, consciously experiencing) a given construction according to certain instructions (which may be either consciously or unconsciously triggered). This operation can be represented as (α) (Marchetti, 2010, 2015, forthcoming):

$$(\alpha)\mathrm{op}\rightarrow C \Rightarrow C_1$$

where C_1 represents the conscious experience that arises as a consequence (=>) of the operation (*op*) unconsciously performed on (→) an earlier conscious experience C. For example, when we add 2 and 3, we perform a certain operation (op: add 3) on (→) 2 (C), having 5 (C_1) as a result (=>); when we think what will happen upon seeing some dark clouds, we perform some kind of inferential operation (op) on (→) the perceived dark clouds (C); as a consequence, we will produce (=>) the idea that it will rain soon (C_1). It should be noted that while the operation on C is performed by an unconscious mechanism (we do not know what kind of operations our mind performs when we add 2 and 3: the only thing we are aware of is that we get 5), the instruction to perform it may be either consciously given or unconsciously occasioned (we can deliberately decide to add 2 and 3; but a certain idea or sensation can come to our mind because of free association, without any deliberate input).

A specification concerning the role that the self has in the production of conscious experience is in order. The essential process in the production of conscious experience is attention. Attention is necessary for conscious experience: there cannot be conscious experience without attention, even though there can be attention without conscious experience (Marchetti, 2012; Noah and Mangun, 2020). However, attention alone is not sufficient for consciousness to occur with the contents and in the form we are accustomed to experiencing. In order for us to be able to consciously experience any sensible, perceptible contents, such as "red", "salty" or "heavy", as well as more intangible contents, such as memories, ideas, and emotions, attention must be provided with the necessary contents and instructions: these are provided by the self. Conscious experience arises from the continuous interplay between the self and attention (Marchetti, 2010, 2018, 2022 and forthcoming).

In sum, the best way to analyze relators – whether they are individual words or symbols, such as prepositions or conjunctions, or grammatical constructions that express a relation, such as the noun-adjective phrase and the subject-predicate construction – is to: (i) consider the conscious experience of the overall meaning of the construction they realize as the result of an assembling activity performed by the self on the individual elements that constitute the construction (the two or more separate elements that are assembled and the relator); (ii) examine how the overall meaning of the construction differs from the individual, separate meanings of the elements constituting it. On the basis of this analysis, it is then possible to compare the various kinds of relators in order to understand if they can be differentiated and grouped into classes (such as prepositions, conjunctions, pronouns, etc.) according to the common way in which they work.

2. PREPOSITIONAL ASSEMBLING

For analytical purposes, I propose representing the new entity formed by a preposition as (β):

(β)X*prep*Z

and term (β) *prepositional assembling* (PA). The word "assembling" is meant to convey the idea of the active work that relators do.[1] As a possible alternative, the word "construction" could have been chosen, but it could cause some misunderstandings because for example "prepositional construction" is sometimes used in the sense of "prepositional phrase" to identify only the "*prep*Z" elements.

In the case of PAs, the two elements X and Z are variously termed by linguists: for example, De Felice (1960) speaks of "initial semanteme" and "final semanteme", Benedetti (2011, 2015) and Ceccato (1969; Ceccato and Zonta 1980) of "first correlatum" and "second correlatum", Weinrich (1988) of "base" and "adjunct", Carstensen (2015), referring to locative prepositions, of "located object" and "reference object", Merle (2017) of "repéré" or locatum and "repère" or locator, cognitive linguists in general preferably of "trajector" (or TR) and "landmark" or (LM) (see for example Tyler and Evans, 2003), but also of "Subject" and "Landmark" (Lindstromberg, 2010), "figure" and "ground", and "referent" and "relatum".

X and Z can be of varying linguistic complexity, ranging from a noun phrase (NP) ("A glass of wine") to an entire clause ("He caught a bad cold at summer camp", "He raised the question of why it had been concealed").

Usually, the elements of PA occur in the order indicated by (β), but it is not infrequent to postpone X after Z – see "dinner" in (4.1) –, even though sometimes changing the order implies slightly changing the overall meaning of the PA (Cadiot, 1997: 19). Sometimes, Z, as well as X, can be left out altogether (4.2).

(4.1) After dinner, we went out.

(4.2) A: Where did you put it, above or below the table?
B: I put it below / Below.

According to the analyses I have performed, what distinguishes prepositions from the other relators in English, Italian and French languages,[2] is the way prepositions assemble elements: namely, *prepositions make the second element of the PA, Z, determine the first element of the PA, X, according to the specific instructions each preposition provides.*

Some clarifications concerning the terms "determine" and "instructions" are in order.

"Determine" must be intended in the logical sense of a process making a mental construction (meaning, notion, concept, etc.) more specific by the addition, definition, specification, or modification of attributes. As such, it stands for the various kinds of combined actions that the prepositional phrase (*prep*Z) brings to bear on the mental construction of X: combined actions that result in a range of effects on the construction of X, from assigning a position in a domain to the construction, to specifying how the construction must be completed. To exemplify, in "Wine of

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1 I thank Jean-Marie Merle for having suggested the term "assembling" to me.

2 Obviously, further research is needed to verify this in other languages.

Italy", "Italy" determines "wine", as instructed by the preposition "of", by assigning an Italian origin to the wine as opposed to another origin (which allows one to identify the wine as a specific instance or kind of wine). Likewise, in "to hit with a hammer", "a hammer" determines "to hit", as instructed by the preposition "with", by characterizing the act of hitting according to the property of the tool used to perform it. In other words, Z (Italy, hammer) determines X (wine, to hit) according to the operations expressed by the preposition (of, with). This implies that X assumes, in addition to the basic features it possesses, the characteristics defined by Z, according to the instructions provided by the preposition. In sum, my use of the term "determine" is intended to express the very general idea that "the mental construct X is operated on or further elaborated based on *prep*Z, so as to make it more specific": as such the term "determine" includes as different notions as "delimit", "define", "specify", "identify", "modify", "characterize", "constrain" and of course "determine". It should be noted that some other scholars prefer to keep these different notions separate: for example, Merle (personal communication) uses "determine" when the referential value is involved, such as "The man *in the corner* looked sad", "characterize" when a property is narrowly associated to what it modifies, such as "I am a *poor lonesome* man", and "modify" when the property does not alter the referential value of the referent, such as "The poor man, *seated in the corner*, looked sad".

"Instructions" refer to the set of cognitive operations (CO) that the user must perform to make Z determine X, and that consequently produce the conscious experience conveyed by the meaning of each preposition.[3] In my model (Marchetti, 2010, 2015, 2018, forthcoming), the set of CO includes two big subsets: the operations performed by attention and the operations performed by the self.

Attention can for example be stimulus-driven or goal-directed (Corbetta and Shulman, 2002, Corbetta *et al*., 2008), internally or externally focused (Chun *et al*., 2011), spatially oriented (Posner, 1980; Posner and Cohen, 1984), focused at variable levels of size, being set either widely across a display of objects or narrowly to the size of a single object (Alvarez, 2011; Chong and Evans, 2011; Demeyere and Humphreys, 2007; Treisman, 2006), focused at variable levels of intensity (La Berge, 1983), stopped (Logan, 1983, 1985; Umiltà, 1988, 1994), split simultaneously between central processes and peripheral processes, as well as between different perceptual modalities (Pashler, 1998), sustained or maintained for variable, though limited, amounts of time (La Berge, 1995), even when distributed over separate objects (Eimer and Grubert, 2014), be discarded (Benedetti, 2011), etc.

Among the most important operations performed by the self, there are those of working memory (WM), which helps overcome the limits imposed by the working of attention. Generally speaking, WM makes it possible to keep items in the background for a certain time, while simultaneously

[3] The idea that linguistic meanings can be considered as a kind of instruction is not new and has already been put forward by various scholars (for example, Cadiot, 1997; Col *et al.*, 2012, 2017; Marchetti, 2006; Weinrich, 1988).

operating on new items, which allows several kinds of operations to be performed such as: flexibly building and maintaining new structural representations by establishing and holding temporary bindings between contents (i.e., objects, events, words) and contexts (i.e., positions in a generic cognitive spatial or coordinate system, or argument variables in structure templates) (Oberauer, 2009), associate items, comparing two or more items and imagining future events (Hill and Emery, 2013).

Another important system of the self is long term memory (LTM), which stores semantic information in *domains.* By "domain", I mean a representational field or structure organized around one or more quality dimensions, which allow one to (i) order entities in general (physical objects, beings, events, ideas, qualities, etc.) along the dimension(s) of the field, (ii) distinguish the entities of the domain on the basis of their reciprocal, ordered position in the domain, and (iii) distinguish and separate a representational field from all other representational fields. Examples of domains are space, time and what can be defined as "typological" domains (e.g., the map of the body, the map of the world), that is domains that contain objects, events, qualities, features, and so on, that can be ordered, classified, ranked, etc., such as animals, cars, materials, colors, temperatures, geometrical forms, numbers, specific objects, artistic genres and scientific theories.

Equally important among the operations performed by the self are those involved in the control of body movements and organs: these operations underlie the cognitive system that Talmy (2000) defines as *force dynamics*, which allows for the conceptualization of how we corporeally experience physical forces acting in the presence or absence of barriers and obstacles (on the application in linguistics of the semantic category of force dynamics and the interaction of this cognitive system with attention, see Lampert and Lampert G., 2013; Lampert, 2015).

Figure 4.1 exemplifies the main CO that are necessary to understand the meaning of a PA. Here, it is assumed that the subject identifies the input words as a PA (and not, for example, as three distinct, isolated words) before he semantically processes the phrase. Actually, there is no general agreement among psycholinguists about the fact that syntactic processing precedes semantic processing (Yang *et al.*, 2015). However, even making a different assumption, while possibly implying some additional processing steps, does not exclude the need for the steps depicted by Figure 4.1.

The processing flow during language production differs from that depicted by Figure 4.1, which concerns language comprehension, mainly because, in the former, meanings are first mentally constructed and then the corresponding words activated (as evidenced by the cases in which one knows what to say, but cannot find the right word). However, the need for processing steps 2, 4 and 5, which allow the meaning of X to be determined by the meaning of Z according to the instructions provided by the preposition, is not in question.

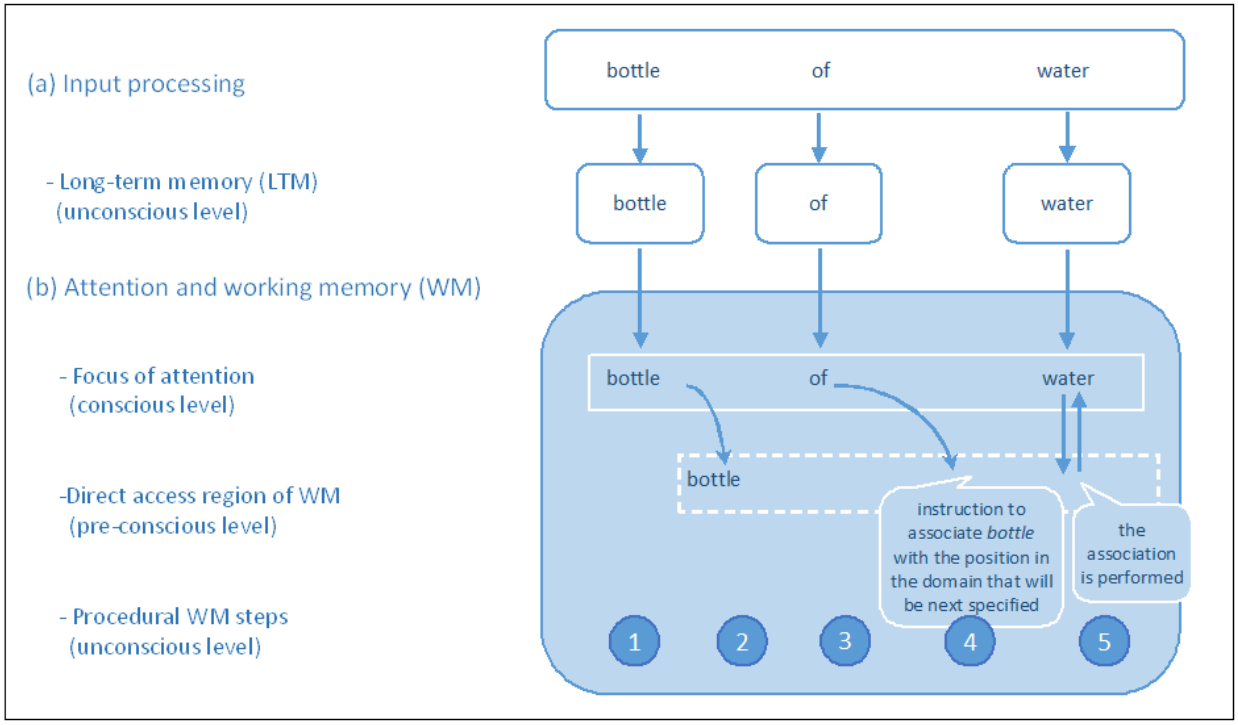

Figure 4.1. Main cognitive operations (CO) involved in understanding the meaning of a prepositional assembling (PA)

(a) Input processing. The words "bottle", "of" and "water" prompt the corresponding items stored in long-term memory (LTM), making them available for further attentional processing. Additionally, the input words are identified as a PA. The goal of understanding a PA activates the relevant routine in procedural working memory (WM), which defines the necessary steps of the process (represented by numbers).
(b) Attention and WM level. Step 1: Attention reactivates the meaning of the word "bottle" (solid-line rectangle) from LTM, which renders it conscious. Step 2: The meaning of the word "bottle" is stored in the direct access region of WM (dashed-line rectangle), which implies that it is temporarily removed from the foreground of consciousness, but immediately accessible for further processing (hence the preconscious state, as defined by Dehaene *et al.*, 2006). Step 3: Attention reactivates the meaning of the word "of" from LTM. Step 4: The meaning of "of" instructs one to identify the stored item "bottle" by associating it with the position in the domain that will be specified by the meaning to be successively constructed. Step 5: Attention reactivates the meaning of the word "water" from LTM, which supplies both the domain and the position in the domain to be associated with the stored item "bottle". Consequently, the meaning of the prepositional assembling is consciously experienced. Note: The WM model is based on Oberauer (2009), and Oberauer and Hein (2012).

Despite referring to the preposition "of" and consequently to the specific CO implied by this preposition (described by the contents of steps 4 and 5), the process depicted by Figure 4.1 can be generalized with every PA: every PA implies that the meaning of X (activated in step 1) is

determined (through steps 2, 4 and 5) by the meaning of Z (activated in step 5) according to the instructions of the preposition (provided in step 4).
A more detailed analysis of prepositions that motivates my conclusions on the specific assembling function of prepositions will be offered in the next chapter of this book.
A final remark about the result of my analysis of prepositions. Whereas the relational function of prepositions is quite commonly recognized among linguists (but there are exceptions, such as Tremblay, 1999), the fact that, in a PA, Z determines X is not so generally acknowledged. Some linguists explicitly recognize it: for example, Franckel and Paillard (2007: 13),[4] Merle (2017: 9),[5] Paillard (2014) and Weinrich (1988) (however, Weinrich extends this feature to other grammatical classes such as conjunctions and relative pronouns). Cognitive linguists (for example, Langacker, 1987; Navarro i Ferrando, 2002; Tyler and Evans, 2003), by positing an asymmetry between the trajector and the landmark, in which the latter provides points of reference to locate the former, also recognize the determining function of Z for X. However, as is defined in most cognitive linguists' models, the determining function of Z is of limited usage and application: given that their models are essentially spatial in nature (they consider the core meaning of prepositions as spatial or at least they consider spatiality as one of the fundamental dimensions of the meanings of prepositions), the explanation of how Z determines X only applies within the spatial domain, and can hardly be extended to also cover other, different domains.

3. A COMPARISON BETWEEN PREPOSITIONS AND THE OTHER MAJOR CLASSES OF RELATORS

Let's now see how the major classes of relators other than prepositions assemble elements and how the way of assembling elements of the former differs from that of the latter.

3.1. Conjunctions

The elements assembled by coordinating conjunctions *remain independent of each othe*r. Let's consider the conjunction "and". In "I eat apples and pears", neither the first element (apples) determines the second one (pears) nor vice versa: the kind of apples that I eat does not depend on the pears (and vice versa). Rather, what the conjunction "and" actually does is to assign a specific position in the domain defined by the context to each element it assembles (the act of "eating"), in such a way that the two elements occupy different positions in the same domain (Marchetti, 1994): in our example, "apples" occupy a different position from the one occupied by "pears" in the domain "fruits" ("apples" are not the same thing as "pears").

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4 "[…] une préposition est un *relateur* (dans le cadre d'un schéma X R(prép) Y) […] On peut dire qu'elle met en rapport deux éléments X et Y, en constituant une relation non symétrique, dans laquelle Y prend la fonction de repère de X. En tant que repère, Y est source de détermination pour X."

5 In what he calls *repérage sémantico-référentiel*, "X reçoit de l'apport de Y, via la relation prépositionnelle, une caractérisation, une qualification, une modification ou une complémentation, qui revient à spécifier X via sa mise en relation avec Prép Y."

Importantly, compared to a PA, (a) the domain that determines the position of the first element ("apples") is not defined by the conjunction ("and") and the second element ("pears") but by the specific context (the act of "eating"); (b) because of this, even by inverting the order of the elements ("I eat pears and apples"), the overall meaning of the phrase does not change substantially – apart from a possible difference of attentional stress on the elements (Lampert, 2009; Talmy, 2007) –, which is not the case of PA. An exception is represented by irreversible binomials such as "back and forth" and "rock and roll", which however are the product of purely cultural conventions. In a case such as "He played and won", the conjunction "and" assigns a specific temporal location to the two events: therefore, inverting the order would make the sentence inconsistent with the actual occurrence of events. However, even in such a case, the two events remain independent of each other in the sense that, even if it is true that one cannot win without playing, the fact of winning does not necessarily follow from playing (one can play without winning, or play just to play, without any intention of winning), nor does it determine the activity of playing. Quite different is the case of a sentence such as "He played for victory", where the use of the preposition "for" clearly expresses the intention to win, which makes "victory" determine the kind of "playing".

As to subordinating conjunctions, it could be objected that they do not assemble elements by maintaining the reciprocal independence of the elements, and that in this regard they are undistinguishable from prepositions. For example, "if" and "unless" assemble elements by making one element (X) depend on another (Z); likewise, "after" and "before" assemble elements by making one element (X) be determined by another (Z).

As far as subordinating conjunctions such as "if" and "unless" are concerned, my answer is that the dependence of X on Z does not concern so much the content or the identity of X as the fact that X really takes place. In "If it stops snowing, we can go out", Z ("it stops snowing") does not determine the content of X ("we can go out"), in the sense that the "kind" of "going out" does not change depending on Z. There are not different "kinds" of "going out" that are determined and elicited according to what Z states: the activity of going out, in itself, is only one and always the same. Rather, what Z determines is the occurrence of the activity of going out. Some might not be satisfied with this explanation and could object that the same holds also for "bottle of wine" vs. "bottle of water": the kind of bottle can be the same in either case, for example a glass bottle. It should be noted, however, that in this case the use of the preposition "of" specifies a different identity: even if the two bottles are of the same kind, they are not the same because, for example, they are located in different places or bear different labels.

As to the objection concerning conjunctions such as "after" and "before", I think that it is undisputable that, for example in "Bill left before it started raining", "before" makes "it started raining" determine "Bill left": the activity of leaving happens at a certain time that is defined by "it started raining". However, I claim that in this case "before" cannot be considered to be a conjunction. As we have seen above, the classification of terms such as "before" and "after" as conjunctions is based on a purely syntactic criterion: grammars consider these terms as

prepositions if they are followed by an NP ("Bill left before the meeting"), but as conjunctions if they are followed by a subordinate clause ("Bill left before it began") (Huddleston, 1984). This criterion, which was already criticized by linguists such as Jespersen (1924) and Pottier (1962), proves to be completely inadequate when one takes into consideration the way in which these terms relate elements. My proposal is therefore to adopt a different criterion, based on a definition of relators that distinguishes them according to how they relate elements, and consequently reclassify these terms as prepositions.

3.2. Relative pronouns, adverbs and determiners

Theoretically, relators allow for endless combinations of linguistic elements. The combinatorial function of relators is made possible – among other mechanisms – by working memory (WM) and procedural memory (Benedetti, 2006). However, the intrinsic capacity limits of these memories (Cowan, 2000; Oberauer and Hein, 2012) put severe limits to the combinatorial capacity of relators. Among relators, relative pronouns, adverbs and determiners help overcome these capacity limits by re-loading, in a summarized form, in WM the semantic content that was previously stored in short term memory, or in some other kind of wider memory. It is this peculiar function (which was originally formulated by Ceccato and Zonta, 1980) that primarily distinguishes relative pronouns, adverbs and determiners from prepositions, which do not have any similar function. Moreover, when used as subjects or direct objects, relative pronouns and determiners also differ from prepositions because they contribute to build subject-predicate constructions or verb-direct object constructions, which, as will be seen soon, substantially differ from the PA.

3.3. Noun-adjective phrases

Like the PA, noun-adjective phrases are also constructed by means of a mental process by which one element of the phrase mentally determines the construction of another element of the phrase. However, the role of the elements in the construction process (what-determines-what) of noun-adjective phrases is exactly the opposite of that of the PA. In the mental construction of noun-adjective phrases, the noun supplies the basis or boundaries for determining the adjective (Marchetti, 1993): the adjective is such because it precisely refers and applies only to the entity (object, person or event) described by the noun, and not to something different from, or outside the entity. To mentally construct a noun-adjective phrase such as "red flower", first the object "flower" must be constructed or identified together with the color domain (another adjective would imply a different domain: for example, "beautiful" would imply the aesthetic domain) and then, on this basis, the precise position of the object in the domain can be decided on ("red"). That is, the element that in the mental construction of a noun-adjective phrase acts as the determining element (the noun "flower"), in a PA acts as the determined element X (such as "flower" in "flower of Scotland").

In sum, in the mental construction of noun-adjective phrases, the adjective is determined by the characteristic – identifiable with a certain position within a certain domain – of the noun, whereas in the mental construction of a PA, X is determined by Z according to the operations expressed by the preposition. Therefore, while a noun-adjective phrase allows for mentally determining an element (the noun) primarily by means of the element itself, a PA needs a second element (Z) to determine a first element (X).

The idea that the noun determines the adjective may sound counterintuitive, because usually the contrary is maintained, that is, it is the adjective that determines or modifies the noun. However, it must be remembered that here the verb "to determine" refers to the process by means of which one or more elements affect the mental construction of another element (or other elements), and not to the use (modification, qualification) that can be made of the element(s) constructed by means of such a process. The process of constructing an element and the use of the constructed element are two quite distinct things: one thing is to mentally construct an adjective, quite another to use it once it is constructed.

Figure 4.2 shows the main CO that are necessary to understand the meaning of a noun-adjective phrase. For the sake of graphic simplicity, an example from the Italian language ("fiore rosso", Eng. "red flower") was chosen.

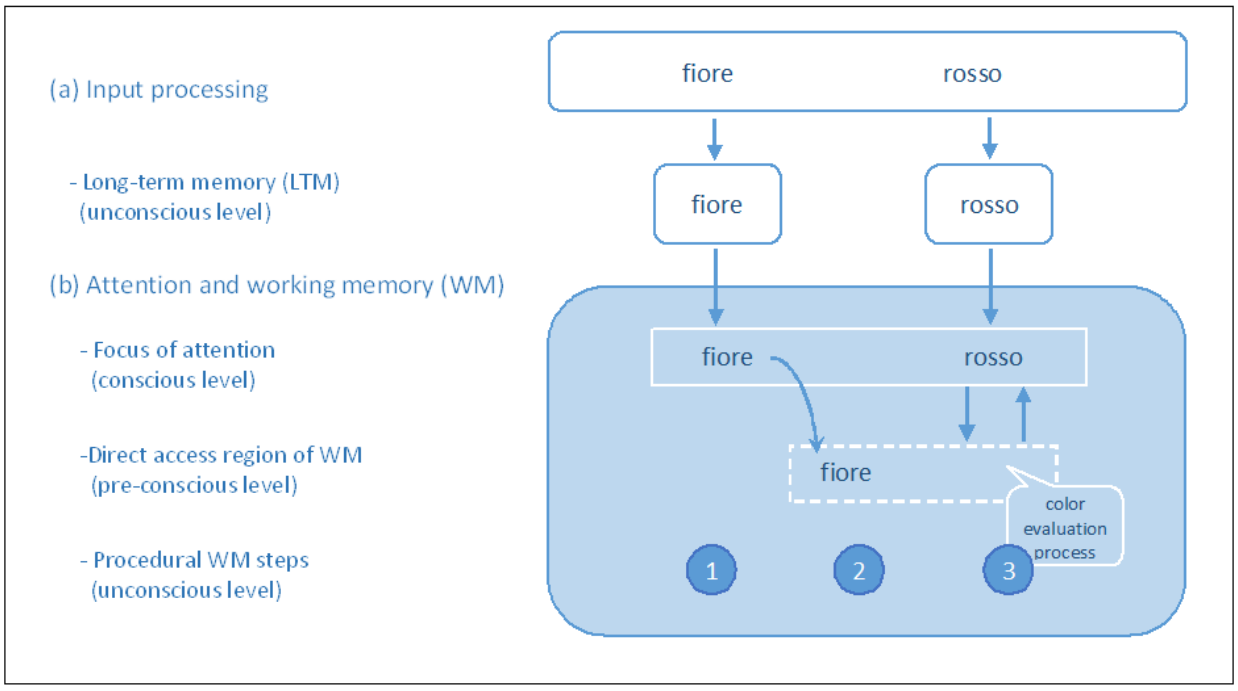

Figure 4.2. Main CO involved in understanding the meaning of a noun-adjective phrase

(a) Input processing. The Italian input words "fiore" ("flower") and "rosso" ("red") prompt the corresponding items stored in long term memory (LTM), making them available for further attentional processing. Additionally, the input words are identified as a noun-adjective phrase. The goal of understanding a noun-adjective phrase activates the relevant routine in procedural working memory

(WM), which defines the necessary steps of the process (represented by numbers). (b) Attention and WM. Step 1: Attention reactivates the meaning of the word "fiore" (solid-line rectangle) from LTM, which renders it conscious. Step 2: The meaning of the word "fiore" is stored in the direct access region of WM (dashed-line rectangle), which implies that it is temporarily removed from the foreground of consciousness, but immediately accessible for further processing (hence the preconscious state, as defined by Dehaene *et al.*, 2006). Step 3: Attention reactivates the meaning of the word "rosso" from LTM by referring it to the stored item "fiore". This implies that the reactivation of "rosso" results from a process of color evaluation performed on "fiore" in the direct access region of WM, by using the scale of colors of the color domain. Consequently, the meaning of the noun-adjective phrase is consciously experienced. Note: The WM model is based on Oberauer (2009), and Oberauer and Hein (2012).

As with the Figure 4.1, here too it is assumed that the subject identifies the input words as a noun-adjective phrase (and not, for example, as two distinct, isolated words) before semantically processing the phrase.

The evaluation process implied by step 3 of Figure 4.2 is more evident when one is asked to describe the color of an object. In such a case, it is quite easy to realize that that adjective results from: (i) directing and focusing one's attention based on the object to be described, which implies sub-operations such as where to direct one's gaze and how to narrow one's attention and exclude other objects; (ii) evaluating the object with reference to the scale of colors of the color domain, which allows one to restrict one's evaluation to that domain (instead of another domain) and discriminate the color.

One could argue that the same evaluation process takes place even if one describes the color of the object by means of a prepositional phrase (such as "with red petals" in "a flower with red petals") and, therefore, that there is no difference between an adjective and a prepositional phrase. My answer is that in this case the evaluation process is quite different from the one that leads to the construction of a noun-adjective phrase. Firstly, attention is specifically focused on the petals after being focused on the whole flower. Secondly, the use of a PA requires that a verb (whether a copula or another verb) is (even though only implicitly) used to express the PA ("It/This is a flower with red petals", "I see a flower with red petals"). The use of a verb makes the PA act as either the complement of a copula construction or the direct object of a verb-direct object phrase. This implies, as we will see, that the PA is constructed and determined with reference to the grammatical subject or to the verb, just as an adjective is constructed and determined with reference to a noun. In other words, *the whole PA* inherits, through the verb, the characteristic of being determined. This explains why the prepositional phrase seems to be constructed as adjectives are.

The processing level and steps of Figure 4.2 also hold when the adjective precedes the noun, as is the case in English language. Obviously, in this case the order of the CO differs from that of Figure 4.2, because what is processed first is the meaning of the adjective; moreover, some additional steps may be required, such as the storing of the adjective in the direct access region of WM while

the noun is processed. This however does not exclude the need for the processing levels and steps depicted by Figure 4.2.

A first, even though partial, empirical evidence of this analysis is provided by Fyshe *et al.*' experiment (2019), in which subjects' neural representation of the semantic information referring to adjective-noun phrases was tracked with MEG (magnetoencephalography) over time during stimuli presentation. The experiment shows that, even if the adjective precedes the noun: (i) a neural negated representation of the adjective is also present during noun presentation ("negated" refers to the fact that the representation is the reverse of what is observed during adjective presentation); (ii) the neural representation of the adjective is reactivated in its original (non-negated) form, after reading the noun and it is a good match with the representation observed during adjective reading; (iii) during the reactivation of the adjective, a negated representation of the noun is present. According to the authors, the negated representation is a holding pattern that allows the brain to store a word's meaning in memory while performing another action: "In the case of the adjective, the next action is reading the noun. In the case of the noun, the next action is recalling the adjective for composition" (Fyshe *et al.*, 2019: 4465).

3.4. Subject-predicate construction

What holds for the noun-adjective phrases, also applies to the subject-predicate construction. The subject provides the basis for determining the predicate; the predicate is determined with reference to the subject. As Chafe (1994: 83) observed, the grammatical subject is a "starting point", a basis from which the clause develops and moves on.

3.5. Verb-direct object construction

As far as the verb-direct object construction is concerned, I will limit my analysis only to the case in which the direct object is either a pronoun or an NP. The other cases must be treated separately because the role of other relators must also be taken into consideration, such as the conjunction "that" in that-clauses.

Contrary to prepositions, which instruct one to assign, in addition to the basic characteristics that X already possesses, the characteristics specified by Z to X, the verb-direct object construction does not imply any assignment of additional characteristics to the first element X (the verb) on top of the ones it intrinsically has. For example, in a sentence such as "I eat an apple", "an apple" does not necessarily direct the user's attention to how, where, when or why the act of eating occurs, that is, to the characteristics that the use of prepositions typically highlights. Rather, in the verb-direct object construction, it is the verb that provides both the process and the domain for determining the second element Z (the direct object). Still using our example, the literal use of the verb "to eat" elicits the construction of direct objects that belong to the domain of entities that are "eatable", and that can undergo the process of being eaten.

3.6. Copulas

Another important kind of relator, even though it is not universally present in all languages (Pustet, 2003), is the copula. Even though for some scholars, namely modern syntacticians, copulas are meaningless carriers of tense and agreement features, in the sense that they would not add any semantic content to the predicate phrase they are contained in, copulas have generally been considered as having a linking function, by means of which they relate a subject to a complement (or non-verbal predicate). For philosophers and logicians, copulas even express an operation of judgement and can be considered as a sign of a truth-claim.

Generally speaking, copulas can have an identificational role, which allows for indicating the uniqueness of the referent, such as in "This is Sally", or an ascriptive role, which allows for generally indicating a state of affairs, such as belonging to a class of items ("he is a teacher") or a property ("it is red"). That is, copulas serve to express the result of an evaluation or a judgement made about the subject. In this view, the linking function of copulas can be assimilated to that of noun-adjective phrases, in that the complement is determined by the subject. Obviously, copulas differ from noun-adjective phrases because they additionally supply tense and the other verbal inflectional features.

3.7. Adverbs

The class of adverbs has sometimes been considered a "trash-can" class because of its heterogeneity. Indeed, the variety of words it includes makes one suspect that they have been placed into this class because they could not fit into any other class (Cervoni, 1990).

In its heterogeneity, the class of adverbs includes some words which according to some linguists can be considered to function as indistinguishable from prepositions: adverbial particles (or simply, particles). This view would be supported mainly by three kinds of claims: particles and prepositions behave syntactically alike, particles have the same meaning as their related prepositions, and particles are reduced prepositional phrases. According to this last evidence, for example, particles can be assimilated to prepositions because they need a reference (which is precisely what the element Z of the PA provides) that, despite not being explicitly stated (because provided by the situational context, something previously discussed, or the shared knowledge), allows the user to characterize the verb or NP as specified by the given adverbial particle. A sentence such as "I have told you all this before" can be understood because one knows that "before" implies "before now", and "now" provides the reference that allows one to determine when the act of telling occurred. The view that particles are indistinguishable from prepositions has led some linguists (Huddleston and Pullum, 2002; Pottier, 1962) to propose reclassifying particles as prepositions.

This view, however, is criticized by other linguists who rebut the claims put forward by those who maintain that particles are prepositions. For example, Cappelle (2004) maintains that the class of particles should be kept distinct from the class of prepositions because particles have different

distributional properties from prepositional phrases, do not always have the same meaning as their formally related prepositions, and cannot always be analyzed as reduced prepositional phrases (from what original prepositional phrase could the particle “down” in “He took her hand and kneeled down” be reduced?).
Moreover, it should be considered that, generally speaking, particles have a fairly close bond with the verb preceding them and contribute to modifying the original meaning of the verb. This can be clearly seen by comparing (4.3) and (4.4):

(4.3) She swept off the stage (cleaned it).
(4.4) She swept off the stage (did her sweeping elsewhere).

As O’Dowd (1998: 23) explains, the particle “off” in (4.3) adds a completive adverbial meaning to the verb, indicating that she completed the job of sweeping the stage, whereas the prepositional phrase “off the stage” in (4.4) modifies the clause “She swept” by expressing the location where the event took place (offstage as opposed to onstage).
The modification of the original meaning of the verb by the particles can go so far as to radically change it, such as with the idiomatically verb-particle collocations “hang out” (= relax) and “screw up” (= perform badly). Clearly, in these cases, particles cannot be treated separately from the verb, because the meaning of both forms came to be fused and the verb-particle functions as a lexical item in its own right.
On the whole, I think that this is sufficient evidence to treat particles as a class of words of their own, distinct from prepositions, and not to include them in the set of samples used to analyze prepositions.
Apart from particles, the class of adverbs contains a very large subset of words that contributes to building relational constructions with verbs, adjectives, other adverbs, and phrases. In languages such as English and Italian, the adverbs belonging to this subset typically derives from adjectives: in English they take the derivational *-ly* ending (but not all words ending in *-ly* are adverbs: “lovely” is an adjective, “rely” a verb, “assembly” a noun and “immediately” is both and adverb and a conjunction) and in Italian the derivational *-mente* ending. However, this subset also includes other adverbs, such as “often”, “always” and those formed by the English suffixes *-ward(s)*, *-wise* and *-way* (“eastwards”, “straightway”, “clockwise”) and by the Italian suffix *-oni* (“ginocchioni”, “tentoni”, etc.).
These adverbs usually indicate the manner (“badly”, “rightly”, “slowly”, “attentively”, “seriously”, etc.) in which the process expressed by a verb happens, or how frequently (“usually”, “generally”, “commonly”, etc.) it occurs, but they also modify adjectives (“a sufficiently long delay”), another adverb (“she spoke sufficiently slowly”), or an entire sentence (“Probably, they left for their holidays”).
The relational constructions built by this subset of adverbs is similar to the noun-adjective construction, in that these adverbs act as adjectives: that is, they indicate the result of evaluating

the entity (referred to by the verb, adjective, adverb or sentence) with reference to a certain domain. For example, in "She runs quickly", "quickly" indicates the result of the evaluation of the action of running by using the scale of speed: a result which differs from other possible results, and that are indicated by other adverbs, such as "slowly" and "rapidly". This has led some scholars to assimilate this kind of adverb to adjectives: for example, Vaccarino (1981: 171) defines them as "adverbial adjectives". It should be noted, however, that, generally speaking, adverbs differ from adjectives in that they can only be used to modify words other than nouns. In Guillaumist terms, this difference can be expressed by saying that adverbs are characterized by a "second-degree external incidence", as opposed to the first-degree external incidence of adjectives and verbs (Guimier, 1988).

4. CONCLUSION

In this chapter we have seen that prepositions can be defined as follows (γ):

> (γ) Prepositions are relational tools that produce a prepositional assembling (PA) of the X*prep*Z type by making Z determine X according to the specific instructions provided by each preposition. The overall meaning of the PA so produced differs from the individual meanings of the three elements of the assembling (X, Z and the preposition).

Using the terminology of formula (α) described above, we can also say that a PA is the conscious experience (C_1) that is produced (=>) by unconsciously performing the operations (*op*) specified by the preposition on (→) a previous conscious experience X (C).

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CHAPTER V

The Cognitive Operational Meanings of Prepositions and their Leveraging in Learnable Analysis

BY GIORGIO MARCHETTI

ABSTRACT

Operational Linguistics defines prepositions as relational tools that produce a prepositional assembling (PA) of the X*prep*Z type by making Z determine X according to the specific instructions provided by each preposition. In this chapter, I put forward my analyses of the instructions provided by some of the most-used English prepositions: *of*, *in*, *to*, *for*, *with*, *on*, *at*, *by*, *over*, *against* and *without*. The analyses are spelled out in terms of the cognitive operations (CO) that produce the conscious experiences conveyed by each preposition. This overcomes the shortcomings of the traditional debate over the syncategorematic, polysemantic or monosemantic nature of prepositions, which primarily originates from analyzing prepositions in terms of the products of their usage (that is, the overall meaning of the PA) rather than in terms of what produces prepositions.

Keywords: English Prepositions; Cognitive Operations; Meaning; Polysemy; Monosemy.

1. INTRODUCTION

In the previous chapter, we have seen that prepositions have the common property of being relational tools that produce a prepositional assembling (PA) of the X*prep*Z type by making Z determine X according to the specific instructions provided by each preposition. This common property of prepositions groups them together in the same linguistic class and sets them apart from the other kinds of relators (conjunctions, pronouns, etc.). Importantly, the assembling operation makes the PA acquire an overall meaning that differs from the individual meanings of the three components of the assembling (X, Z and the preposition).

In this chapter, I will present my analyses of some of the most frequently used English (simple) prepositions: for each preposition, I will show the specific instructions that it provides on how Z determines X. As clarified in the previous chapter, the term “instructions” refers to the cognitive operations (CO) that one must perform to make Z determine X, and that make one consciously experience the meaning of the preposition.

In order to identify the CO conveyed by each preposition, I analyzed the conscious experiences that, invariably and independently of the context, accompany and are prompted by the use of the preposition. The main method I used was to systematically compare the conscious experiences elicited by using (i) the same preposition in as many different linguistic contexts as possible and (ii) different prepositions in the same linguistic context. This allowed me to isolate the conscious experiences of the relation between X and Z which, independently of any context, are prompted by the usage of the preposition.

I performed the analysis by using, as an analytical tool, the set of CO presented in the previous chapter. This allowed me to (re)construct, in terms of such CO, the conscious experience conveyed by each preposition. The set of CO contains the various kinds of operations performed by attention and the self. Among them, an important role for the analyses of prepositions is played by what I call "domains". A domain is a representational field, organized around one or more quality dimensions, that differs from other representational fields, and allows one to order entities and distinguish them based on the position that they occupy in the field. Typical examples of domains are space and time, but equally important are what I define as "typological" domains, which contains objects, events and qualities that can be ordered, classified, etc.: a noteworthy example of a typological domain is the map of our body. Typological domains are formed adopting the basic structure provided by space and time. Importantly, all domains are mentally built primarily by means of attention and working memory (Marchetti, 2009, 2014).

It is important to note that this set of CO is not exhaustive or definitive, but simply provides an analytical tool that allows for an initial, plausible analysis of the meanings of prepositions. The set can always be modified and expanded, according to both the newly acquired knowledge about cognitive processes, and the enhanced analytical methods and procedures. Actually, the analytical work is strictly interlinked with the adopted analytical tools (the CO), not only because the former can only yield what the latter allow, but also because a critical review of the former can modify the latter. In this view, I acknowledge the provisionality of the semantic analyses I have put forward: theoretically, semantic analyses can always be enhanced and further developed by adopting a more articulated and better-defined set of CO.

An important source of inspiration and comparison for my analyses came from the previous analyses made by the scholars of the Operational Linguistics school, notably Ceccato and Zonta (1980) and Benedetti (2011, 2015a, 2015b), who performed these with the same aim (to analyze the meanings of words in terms of mental operations) but adopting (significantly: Ceccato; slightly: Benedetti) different theoretical premises and analytical tools.

I also benefited a lot from the semantic analyses of prepositions performed by linguists who belong to other research traditions. When dealing with these, however, I frequently encountered a problem that for me is ill posed. This problem can be thus formulated: have prepositions only one meaning, more than one meaning, or no meaning at all? Therefore, before I proceed, this needs to be considered.

2. PREPOSITIONS: SYNCATEGOREMATIC, POLYSEMANTIC OR MONOSEMANTIC WORDS?

Studies on prepositions have recurrently debated on the nature of their meanings: are prepositions syncategorematic, polysemantic or monosemantic words? More specifically:

(i) the syncategorematic view holds that prepositions do not have an "independent" (or full, entire) meaning, but can only achieve one in relation to other complementary meanings (Husserl, 1970; Ullmann, 1957);

(ii) the polysemantic view holds that prepositions have multiple meanings which are related in some fashion (just to mention some studies: Deane, 2005; De Felice, 1954, 1960; Lakoff, 1987; Lindstromberg, 2010; Rice, 1992; Navarro i Ferrando, 2002; Sandra and Rice, 1995; Taylor, 1988; Tyler and Evans, 2003; Zlatev, 2003). Usually, the multiple, related meanings of a polysemantic word are graphically represented by means of a network, which can be hierarchical, radial or of some other kind (see Sandra and Rice, 1995). One of the most preferred ways of representing a polysemantic network exploits the psychological concept of prototype (Rosch, 1973, 1978): the multiple meanings of a word are depicted as radiating – at variable distances and with different intensity levels – from a core or prototypical meaning, and sometimes also as directly related to each other;

(iii) the monosemantic view holds that prepositions have just one meaning (Boulonnais, 2008: 88; Ceccato, 1969; Ceccato and Zonta, 1980; Cervoni, 1980, 1991; Col and Poibeau, 2014; Crisari, 1971; Gruntman, 2016; Vaccarino, 1981, 2006; Van der Gucht *et al.*, 2007; Weinrich, 1988). However, it should be noted that even for some of these authors, some prepositions may have more than one meaning, see for example Vaccarino's analysis of the Italian prepositions *con* (1981, 2006), or Cervoni, who does not rule out the possibility that the French preposition *de* can be used with varying degrees of abstractness (Cervoni, 1991) and that the meaning of the Italian preposition *da* can dynamically range from a maximum of prospective movement to a maximum of retrospective movement (Cervoni, 1980).

I consider this debate quite sterile because it originates from some fundamental flaws, the main one being that of mistaking the products resulting from the use of a preposition with the meanings of the preposition itself. But let us consider the various viewpoints on the nature of the meanings of prepositions more in detail.

The syncategorematic view seems to be totally unjustified. This view, despite highlighting an important characteristic of prepositions, that is, that they cannot be used alone (with the exception of the cases in which they are metalinguistically used to exemplify their grammatical role, such as in "*of* and *with* are prepositions") but only as parts of more comprehensive wholes, overlooks the fact that prepositions contribute as much as the single elements X and Z to determine the overall meaning of the PA. As exemplified by (5.1), changing the preposition while holding X and Z constant, the overall meaning of the PA changes accordingly.

(5.1) a. A glass with water.
b. A glass for water.
c. A glass of water.
d. A glass under water.

This implies that each preposition has its own meaning, which differs from the meanings of the other prepositions. If prepositions really had a "non-independent" meaning and acquired a full meaning only from the other words with which they occur, the sentences in (5.1) would be indistinguishable as to their meanings, given that the co-occurring words remain unchanged.
The polysemantic view usually derives from observation of the usage of prepositions: because a preposition can occur in sentences that differ from each other in the meaning they express (whether it is spatial, temporal, instrumental, causal, or else), it is inferred that prepositions have as many meanings as the meanings expressed by the various sentences. However, this inference is wrong because it mistakes *the products of the usage* of a preposition with the meaning of the preposition itself. The only inference that can be drawn from such an observation is that a preposition can be used to construct sentences that express various meanings: nothing more and nothing else. As relational tools, prepositions are like any other tool that is used to relate things, whether it is a dovetail, an electrical connector, an arithmetical operator or else. Their nature does not change because of their various usages, they remain what they are. As Crisari (1971) argues, maintaining that the meaning of a preposition changes when the elements it connects change, is tantamount to maintaining that what the sign "+" does in (5.2a) differs from what it does in (5.2b) just because the addends change.

(5.2) a. 3+2=5
b. 2+2=4

Obviously, one can describe the various usages of a tool and what you obtain or do not obtain by using it (with a hammer you can drive in nails or even break things, but you cannot turn screws). However, this description does not explain *how* the tool works, that is, what it is that makes the tool work the way it works. Only by describing how the tool works (for example: a hammer allows you to drive in nails because it has a certain shape and structure and is made of certain materials that makes it optimal for hitting small iron objects, less optimal for other objects, etc.), can one explain what makes it produce the various observed results.
Whoever equates the meaning of a preposition with the meaning of the PA, commits a hysteron-proteron, in that they assign the properties of the whole to one of the components that has contributed to form the whole. This is quite a common mistake made by researchers who adopt the polysemy approach when analyzing prepositions. For example, Tyler and Evans (2003) claim that *over* means *above-and-beyond* in the sentence "The arrow flew over the target and landed in

the woods", or *focus of attention* in the sentence "She thought over the problem". As Van der Gucht *et al.* (2007: 748) observe, Tyler and Evans neglect that these meanings are not to be attributed to the preposition itself but to the grammatical combinations of the preposition with the other words of the constructions ("fly", "problem", "think", etc.).

Likewise, Sandra and Rice's empirical work on prepositions (1995) is flawed by mistaking the overall meaning of a sentence with the meaning of the preposition that occurs in that sentence.

According to Sandra and Rice, the outcomes of their three experiments disprove the monosemy approach and confirm the polysemy (or "prepositional network") approach. More specifically, Experiment 1 (a sorting task) shows that the subjects are able to consistently sort target sentences containing the prepositions *at*, *on* and *in* according to their spatial, temporal or abstract usage; Experiment 2 (a rating task) shows that the similarity rating for a series of target sentences containing the prepositions *at*, *on* and *in* is significantly affected by the nature of the probe stimulus (a sentence instantiating either a spatial, temporal or abstract usage of the preposition present in the stimulus sentence); and Experiment 3 (a primed semantic decision task concerning the Dutch preposition *in*) shows that prototypical spatial prime PPs (prepositional phrases) exert a strong inhibition effect on the real-time processing of temporal target PPs, an effect which significantly differs from the facilitation effect on prototypical spatial targets.

Actually, what the three experiments disprove is not so much that *prepositions* have only one highly abstract monosemic sense (covering the whole array of their usage types), but that *sentences* (namely PA and PPs) containing prepositions have only one highly abstract monosemic sense. In fact, what Sandra and Rice's experiments (1995) test, is the subjects' ability to sort, rate and decide the acceptability of target *sentences* (whether complete, such as "I saw him *in* my dreams" in Experiments 1 and 2, or partially complete, such as the PP "in the coffee" in Experiment 3). That is, the targets were not prepositions considered individually in and by themselves (which, by the way, are hardly testable with purely psychological methods and techniques), but (complete or partial) sentences containing prepositions. Therefore, Sandra and Rice's conclusion that their experiments reject the monosemy approach holds only for sentences, not for the single, individual prepositions.

Moreover, it should be noted that, more in general, the polysemy approach also poses some other kinds of problems. Firstly, the size or extent of the linguistic context from which one infers the meaning of the preposition: How to define it? What are the boundaries of the linguistic context to consider? Shall one just limit them, say, to the immediate linguistic environment of the preposition, such as the first or the second collocate? Or shall one use a larger context, such as the sentence? But then, why not the whole text? Indeed, a preposition contributes to form the meaning not only of the sentence in which it occurs, but also of the larger text in which the sentence occurs. Moreover, how does one account for the speaker/writer's extra-linguistic (experiential, psychological, etc.) context that motivated the use of the preposition?

Secondly: the infinite regress implied by the meaning of the linguistic context. Even admitting the plausibility of defining the meaning of a preposition as the meaning of the lexical context in which

the preposition occurs, the problem arises of how to define the meaning of the lexical context. Given that theoretically – at least for a strong polysemy approach – all words can be affected by polysemy, including the word denoting the meaning of the lexical context, it turns out that the move to define the meaning of a preposition as the meaning of its lexical context is not decisive at all, because the word denoting the meaning of the lexical context can also be polysemous, and therefore in need of definition. This leads to an endless regress and the impossibility to define the meaning of any word.

Thirdly: the undecidability of the definition of the meaning of the lexical context. Which definition does best fit and describe the meaning of the lexical context? Let us consider an example (5.3) taken from Tyler and Evans (2003: 210).

(5.3) The top of the building.

According to Tyler and Evans, the preposition *of* in (5.3) designates the spatial relation between a particular spatial region (the trajectory TR: "the top") and a larger spatio-physical region (the Landmark or LM: "the building"), in which the TR is located. However, why should *of* designate (only) a spatial relation rather than (also) some other kind of relation (i.e., part-whole relation, architectural features, aesthetic quality, etc.)? It is not uncommon among linguists, above all those belonging to the cognitive tradition, to presuppose that the core meaning of prepositions is essentially spatial, and that all the other additional meanings derive from this core meaning via a metaphorical redescription. However, positing the priority of the spatial dimension over others poses serious problems: it leads linguists to neglect the equally fundamental role played by other dimensions, such as intentionality, agency, and control (Cadiot, 2002a, 2002b); this may in turn bias linguists to favor one kind of spatial representation (e.g., allocentric) to the detriment of another, more fundamental kind (e.g., egocentric) (Cadiot, 2002a); the image-schemas used to represent spatial relation only depict some aspects of the relation between the elements, and do not make explicit some others that are equally, if not more, important, such as the order of attentional selection (Carstensen, 2015).

With this, I do not want to diminish the importance of spatiality, which is certainly one of the main, fundamental dimensions of conscious experience. Actually, all consciously-experienced phenomena (whether perceptions, emotions, thought, dreams or else) take place within what is experienced as being a "single spatial volume" (Revonsuo, 2006: 168). This spatial volume is primarily determined by the working of our attention: the center of our attention and the direction toward which attention is focused defines the orientation of objects in relation to us, if they are located to our right rather than to our left, etc. However, this spatial feature of conscious experience must not be confused with the conscious experience of space. One thing is the conscious experience of space, quite another the spatial quality of conscious experience. You can consciously experience something (e.g., an emotion) without experiencing or being aware of the spatial dimension of your conscious experience.

What I want to highlight is rather that spatiality, as well as other fundamental dimensions such as temporality, intentionality, agency, etc., originate from and are consequent to some basic CO (namely, attention and working memory: Marchetti, 2009, 2014). Without these CO, no spatial (or other) dimension(s) could be consciously experienced. It is therefore necessary, when analyzing the conscious experiences of the meanings of words, not to mistake some experiential dimensions, or parts thereof, with the CO that produce them.

Fourthly: the polysemy fallacy, that is, the exaggeration and proliferation of the number of distinct senses associated with a certain word (which Tyler and Evans themselves acknowledge, 2003: 38-42), which can render hopeless any scientific attempt at analyzing the meanings of words. Moreover, linguists adopting the polysemy approach are sometimes led to assign the same meaning to different prepositions: for example, according to Tyler and Evans (2003) both *before* and *in front of* have a "priority sense". This raises the additional question of why a language should have two different words to express the same meaning.

Fifthly: the implausibility, from the point of view of cognitive processing resources and strategies, of the hypothesis that words recurring with such a very high frequency as prepositions[1] may have many different and sometimes unrelated meanings. As Benedetti (2011: 57-58) argues, referring to the incredibly high number of meanings that linguists attribute to the preposition *of*, why should one of the most-used words in English have so many meanings? Is it not much more likely that a word is so frequently used just because it has one very general meaning?

The monosemy approach would seem therefore to be a more promising alternative for semantic studies of prepositions. However, some criticisms have also been raised against this approach, the most recurring one being that the meaning identified for a given preposition is so abstract and general that it can refer not only to it, but also to other prepositions, which makes it difficult to see how to distinguish the meaning of the former from the meanings of the latter. For example, Rice (1992) rejects monosemic accounts of the prepositions *at*, *in* and *on* because of their inability to formulate schema or features capable of including all appropriate usages of these prepositions while excluding usages of other prepositions. As Rice exemplifies (1992: 91), there is no abstract feature – whether it is *contact*, *pressure*, *support* or else – that is common and exclusive to all usages of the preposition *on*. This criticism is not limited to the monosemic analysis of prepositions, but can be generalized to the analysis of other kinds of words. For example, Fortuin (2001: 38) argues that the basic meaning of the verb *break* given by Goddard (1998: 133) – "X *broke* Y = X did something to Y; because of this, something happened to Y at this time; because of this, after this Y was not one thing any more" – does not help differentiate the verb *break* from the verbs *cut* and *tear apart*.

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[1] According to a statistic made by Saint-Dizier (2006: 3), among the thirty most frequent words in English, nine are prepositions, with the preposition *of* ranking as the second one. The Word Frequency Data, updated at January 2021 (www.wordfrequency.info/samples/lemmas_60k_subgenres.xlsx), shows eight prepositions among the thirty most frequent words in American English, with *of* ranking as the fifth.

The validity of this criticism certainly cannot be questioned. However, it should be noted that, strictly speaking, it only holds for those monosemic approaches that analyze the meanings of prepositions in terms of the *results of the use and applications of prepositions* (e.g., the overall meaning of the PA). In fact, by mistaking the meaning of the whole PA for the meaning of the preposition, these approaches identify, as basic constituents of the meaning of the preposition, distinctive features (whether they are described by means of concepts, such as "contact" and "support", schemas, or graphs) that are (i) not exclusive, because they can also be produced by the usage of some other prepositions (for example, the feature "coincidence" is common to some usages of both "at" and "on"), and (ii) not common to all usages of the preposition, because new usages can always occur, and consequently new features (namely, new meanings of the PA) can be identified (Rice, 1992).

Theoretically, a monosemic approach that does not analyze the meanings of prepositions in terms of the results they produce (e.g., the overall meaning of a PA, such as the concept of "support", etc.), but rather in terms of the CO necessary to produce the (conscious experience of the) meanings of prepositions, should avoid running into this kind of criticism. However, even granting this, one cannot exclude a priori that a preposition has more than one meaning.

In conclusion, in order to avoid all the problems highlighted so far, the best thing is: (i) to avoid taking aprioristically any stance concerning the nature of the meanings of prepositions and leave to the empirical analysis to identify if prepositions have more than one meaning; (ii) to analyze the meanings of prepositions not so much in terms of the products they produce in combination with other linguistic items, as in terms of the CO that produce the conscious experiences of the meanings of prepositions: in so doing, one avoids introducing the products of the usage of a preposition into the analysis itself, and consequently prevents the undue proliferation of distinct senses for prepositions, as well as circular definitions.

Obviously, given Benedetti's observation (2011: 57-58) (i.e., it is highly implausible that the most-used words have many meanings), one should expect that prepositions, which are among the most frequently used words, have only one meaning or just very few.

3. ENGLISH PREPOSITIONS

Let us now analyze some of the most-used English prepositions: *of*, *in*, *to*, *for*, *with*, *on*, *at*, *by*, *over*, *against* and *without*. For the analyses, I used examples from the COCA (Corpus of Contemporary American English: www.english-corpora.org/coca/), the OALD,[2] the CD[3] and other studies of linguistics referred to in the text; the examples for which the source is not mentioned, are my own. For each preposition I will describe the instructions it provides on how Z determines X. The order with which I will present the analyses of prepositions reflects the

[2] *Oxford Advanced Learner's Dictionary*. 1997. Oxford: Oxford University Press.

[3] *Cambridge Dictionary*. 2021. Cambridge University Press. https://dictionary.cambridge.org/us/.

frequency of usage of prepositions according to the Word Frequency Data (WFD), updated at January 2021.[4] I will start with the most-used prepositions first.

3.1. of

There is no doubt that the preposition *of* is one of the most problematic to analyze, both because of its very high frequency of usage and because of the various contexts in which it can be used (Benedetti, 2011, 2015b): indeed, it can be used to build, and refer to, contexts as disparate as space, time, purpose, means, possession, cause, origin, quantity, quality, measure, etc. Because of this, even in recent years some linguists were led to maintain that, in some contexts, this preposition has no semantic value but only a syntactic role (Boulonnais, 2013; Fagard, 2010).[5]
However, when analyzing the instructions that *of* provides about how Z determines X, one realizes that it invariably instructs one *to identify X on the basis of the domain provided by Z*. More specifically, the identification of X by means of Z is made possible by: (i) mentally constructing Z either as a domain of its own or as a member of a domain (in which case, Z occupies a position in the domain that differs from the positions occupied by the other members of the domain); (ii) associating X with Z: if Z is a domain of its own, X will be one of the members of the domain; if Z is a member of a domain, X will be an element associated with it; (iii) differentiating X either from the other members of the domain (in this case, the differentiation is based on the position that X occupies in the domain compared to the positions occupied by the other members of the domain) or from the same element associated with different members of the domain (in this case, the differentiation is based on the position that Z occupies in the domain compared to the positions occupied by the other members of the domain).
Simplifying a little, we can say that Z stands for a domain (either of its own or as one of its members) with which X is associated and which allows X to be identified (by differentiating it either from other members of the domain or from the same element associated with different members of the domain).
For example, (5.4) can be understood in two different ways, according to how "the smell" (X) is identified.

(5.4) Sean doesn't like the smell of garlic (CD).

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[4] WFD can be accessed here www.wordfrequency.info/samples/lemmas_60k_subgenres.xlsx. WFD ranks the prepositions *of*, *in*, *to*, *for*, *with*, *on*, *at*, *by*, *over*, *against* and *without* respectively as the 5th, 7th, 12th, 14th, 17th, 18th, 27th, 33rd, 142nd, 201st, 214th in the frequency list.

[5] "Certains morphèmes ont tendance à perdre leur capacité à indiquer la nature sémantique de la relation entre X et Y: ils ont développé dans certains cas un emploi exclusivement syntaxique, leur seule fonction étant la mise en relation de X et Y, ou l'attribution d'un 'cas', d'une fonction à Y, sans qu'on puisse nettement déterminer une valeur sémantique. C'est le cas par exemple en français moderne de *de* et *à*, qui conservent bien entendu un sens plein dans certains contextes, mais ont parfois un emploi purement syntaxique" (Fagard, 2010: 31).

One possible interpretation (which will be best conveyed by a stress on "smell") is that Sean does not like the smell of garlic, even though he likes its taste (or color, or form, etc.); the second one, is that he prefers the smell of other vegetables (or food) to that of garlic. The first interpretation is made possible by considering garlic (Z) as a domain of its own, made up of different members such as "smell", "color", "form", etc.: in this domain, "smell" is identified thanks to the fact that it occupies a position which differs from the positions occupied by "color", "form", etc. (in the sense that smell is not the same characteristic as color or form). The second interpretation is made possible by considering garlic as a member of the domain "vegetables" (or "food"), which is made up of as different members such as "garlic", "onion", "tomato", etc.: in this domain, "garlic" occupies a position which differs from the positions occupied by "onion", "tomato", etc. (in the sense that garlic is not the same vegetable as onion or tomato). The identification of "smell" occurs thanks to the fact that "smell" is associated with "garlic" and garlic occupies a position in the domain that differs from the positions occupied by the other members of the domain ("onion", "tomato", etc.).

The same can be verified regardless of the kinds of relations that the preposition contributes to build, and independently of the kinds of words that the preposition relates (noun, verb, etc.) (see the examples of Table 5.1).

Table 5.1. Preposition of

Relation/usage as defined by OALD *sb=somebody, sth=something*	**Example from OALD**	**Z allows X to be identified by specifying the domain that makes it possible to differentiate X from other:**
Belonging to sth	The handle of the umbrella	objects (e.g., shovel)/parts of the umbrella (e.g., ribs)
Belonging to sb	That house of theirs in the country	owners (e.g., yours)/properties of the owners (e.g., land)
Relating to sb's role, status or position	The responsibilities of a nurse	employees (e.g., doctor)/characteristics, qualities, etc. of the nurse (e.g., availability)
Originating from a background or living in a place	The miners of Wales	place (e.g., Northumberland)/workers of Wales (e.g., farmers)
Created by sb	The paintings of Monet	painters (e.g., Picasso)/artworks of Monet (e.g., sculptures)
Concerning or showing sb/sth	A picture of the Pope	portrayed people (e.g., a king)/objects belonging or referring to the Pope (e.g., ring)
About sb/sth	He told us of his travels	things he did (e.g., his work)/receivers of the message (e.g., Anna)

Indicating the material used to make sth	A dress of blue silk	material or color (e.g., red)/products made with blue silk (e.g., bag)
Indicating what is measured, counted or contained	2 kilos of potatoes	vegetables (e.g., onions)/quantity or measure (e.g., 5 kilos)
Indicating the size, level, or extent of sth	A diameter of 5 cm	sizes (e.g., 3 cm)/dimensions measuring 5 cm (e.g., length)
Showing the relationship between part and the whole of sth	A member of the football team	teams (e.g., baseball)/people related to the team (e.g., fan)
After some, many, a few and between a numeral or superlative adjective and a pronoun or determiner	Some of his friends	people (e.g., parents)/amounts of friends (e.g., few)
Showing distance in space or time	A town 5 miles north of Derby	towns (e.g., York)/distances from Derby (e.g., 2 miles)
When saying a date	The first of May	months (e.g., June)/days of the month (e.g., last day)
Frequently happening at a specified time	They used to visit me of a Sunday (i.e., on Sundays)	days (e.g., Monday)/people who were visited (e.g., her)
Introducing the object of the action expressed by the preceding noun	The forging of a banknote	objects (e.g., blade)/kinds of actions that can be performed on a banknote (e.g., surface treatment)
Introducing the subject of the action expressed by the preceding noun	Have the support of the voters	people (e.g., fans)/kinds of actions that voters can perform (e.g., attention)
So that sb no longer has or suffers from sth	Relieved of responsibility	functions (e.g., command)/kinds of actions implied by responsibility (e.g., lightened)
Indicating a cause	Proud of being captain	causes (e.g., rich)/effects (e.g., ashamed)
In relation to/concerning sth	The result of the debate	activities (e.g., meeting)/features or phases of the debate (e.g., beginning)
Used before a noun/phrase that specifies what the preceding noun refers to	The city of Dublin	towns (e.g., York)/characteristics, part etc. of Dublin (e.g., river)
Introducing a phrase that describes a preceding noun	A coat of many colors	features (e.g., layers)/objects that colors can help describe (e.g., umbrella)
Used between two nouns, the first of which describes the second	Where's that fool of a receptionist?	people (e.g., pianist)/qualities of the receptionist (e.g., genius)

Used to show whose behavior is being described by it is/was + adjective	It was kind of you to offer	people (e.g., her)/kinds of behaviors that the subject could perform (e.g., silly)

Table 5.1 shows some possible ways in which Z can determine X. Z provides the domain that helps identify X by, either directly or indirectly, differentiating it from other members of the domain. In "The handle of the umbrella", for example, Z can provide either the domain "manufactured objects" that have a "handle" (umbrella, shovels, sword, knife, etc.) or the domain "umbrella" with all its parts (handle, ribs, shaft, canopy, etc.). In the former case, the identification of X, the handle, occurs by differentiating it from other handles belonging to different manufactured objects (e.g., a shovel); in the latter case, by differentiating it from other parts of the umbrella (e.g., the ribs).

As one can see, the meaning of the preposition *of*, that is, the instructions it provides on how Z determines X, always remains *the same* across the various examples. Certainly, the preposition *of* contributes – as much as X and Z – to build the various overall meanings of the PA, which can be spatial rather than temporal, causal or other. However, one must not mistake the various overall meanings of the PA for the meaning of the preposition *of*. The preposition *of* has just one meaning. The variability of the meanings that a PA can assume is determined by the variability of the information conveyed by X and Z.

It can be reasonably supposed that the set of CO underpinning the meaning of the preposition *of* is grounded on the very basic capacity we have to associate any of our sensory experiences (visual, tactile, auditory, etc.) with our proprioceptive sensations in a rather automatic way, which allows for (i) creating and maintaining the map of our body (which is one of the first and more fundamental instances of domain), (ii) controlling and coordinating movements, and (iii) identifying and locating the sensory experiences with reference to our body.

The use of the preposition *of* entails at least two important implications. Firstly, X, by being associated with Z, inherits the property of being an individual (member or element) among other similar or different individuals. As such, the preposition *of* can be used in a very general sense to differentiate anything from anything else, which explains its very wide use.

Secondly, *of* constrains both the range of qualities and characteristics that can be associated with X, and those that cannot. For example, the "blue silk", in "A dress of blue silk", while directing one's attention to the material and color the dress is made of, at the same time tends to divert one's attention *specifically* from other possible materials and/or colors ("red wool") *rather than generally* from everything else (e.g., potatoes, tables, stars, etc.). That is, *of* acts as a selective filter that not only determines what can pass through but also what must be *specifically filtered out* or – to use the term adopted by Luca Magni to better identify this phenomenon – *defocused*.[6]

[6] Luca noted this phenomenon during the research we were performing on the role and importance of metaphors for the Learnable. As far as I know, this is the first time that this phenomenon has been recognized and reported.

Some considerations are in order concerning the phenomenon of defocusing: (a) as it will become clear later in the chapter, the phenomenon of defocusing is common to all prepositions, not only to the preposition *of*, even though each preposition has its own way of specifically filtering out information; (b) as it will be shown in the next chapter, the phenomenon of defocusing becomes particularly evident and can be more easily recognized when the PA is a component of a larger linguistic unit, such as metaphors; (c) even though defocusing can be considered a specific case of what psychologists call "cognitive inhibition" (or "suppression", "restraining" and "repression"), for analytical purposes it is better to distinguish the two notions. Let's see why. MacLeod (2007: 5) defines cognitive inhibition as "the stopping or overriding of a mental process, in whole or in part, with or without intention". Very often, the term "cognitive inhibition" is used in relation to, or as the unavoidable counterpart of, the act of attentionally focusing on or selecting something: as Wundt (1902) observed, to attend to one of several simultaneous stimuli, the others have to be inhibited.[7] In this view, cognitive inhibition indicates a *very basic* operation, which is usually described as ignoring or resisting elements that interfere with the subject's current task (but note that it can also indicate some other kinds of basic operations, such as Inhibition of Return (MacLeod, 2007). This basic operation is rather different from the *more complex and structured* operation prompted by the use of prepositions: this is why it is preferable to adopt a specific term such as "defocusing" to identify the latter; (d) it seems quite plausible to explain the difference between the basic operation of inhibition and the more complex operation of defocusing as the result of the different complexity of the attentional act: the more complex and structured the act is, the more complex and structured the concurrent filtering out will be; (e) finally, it is important to note that prepositions are not the only linguistic elements that filter out information in a selective and complex way. For example, the disjunctive conjunction "or" diverts the comprehender's attention specifically from possible, compatible alternatives to the (usually two) mutually exclusive ones that it presents, rather than from anything else.

3.2. in

According to the WFD, the preposition *in* is the second most-used preposition in English. Most probably, this high frequency usage of the preposition *in* reflects one of the most basic attentional proclivities with which humans are genetically endowed: that of attending to moving objects that go into or out of a container or behind an occluder (Mandler, 2015).

The analysis shows that the preposition *in* invariably instructs one *to mentally assign some part of the space delimited and occupied by Z to X*. This space can be of various kinds: spatial, temporal or typological, and it can be bi-, three- or multi-dimensional. As the examples of Table 5.2 show, what is most important to note is that the kind of space and its dimension are determined not so much by the preposition (contrary to what some polysemantic analyses claim) as by Z.

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[7] However, it must be noted that the term "cognitive inhibition" is also used in relation to other cognitive processes, such as memory and intelligence.

Table 5.2. Preposition in

Relation/usage as defined by OALD ***sb=somebody, sth=something***	**Example from OALD**	**X is assigned some part of the space delimited and occupied by what Z indicates, e.g.:**
At a point within the area or space of sth	The highest mountain in the world	a geographical space
Within the shape of sth; enclosed by	Lying in bed	a place
Indicating movement into sth	He dipped his pen in the ink	a type of substance
During a period of time	In March	a period
After a special length of time	Return in a few minutes	a period
For a period of time	It's the first letter I've had in 10 days	a period
Wearing sth	Be in uniform	a type of dress
Indicating physical surroundings/circumstances	Go out in the rain	a certain atmospheric circumstance
Indicating the state or condition of sth/sb	I'm in love!	a psychological state
Indicating sb's occupation	He's in the army	a certain occupation
Indicating what sb is doing or what is happening at a particular time	In attempting to save the child from drowning, she nearly lost her own life	a certain event
Involved in sth; taking part in sth	Be in a play	a type of activity
Forming the whole or part of sth; contained within sth	There are 31 days in May	a period
Indicating form, shape, arrangement or quantities	A novel in three parts; roll it up in a ball	a type of arrangement, form
Indicating the medium, means, material used	Speak in English; pay in cash	a type of medium, means
With reference to sth; with regard to sth	A country rich in minerals; be lacking in courage	a certain resource, quality
Used to introduce the name of a person who has a particular characteristic	We have lost a first-rate teacher in Jim Parker	a certain person
Indicating a rate or proportion	One in ten said they prefer their old brand of margarine	a quantity

Some clarifications concerning the qualification of "some part of the space" is in order. Firstly, this does not prevent that only a part of X is enclosed by Z and that the remaining part of it is not contained by Z, as the following examples show: "The flower is in the vase" or in "The

construction worker in the hard hat" (Tyler and Evans, 2003: 182). Likewise, it does not exclude that X is larger than Z: "The club in his hand" (Navarro i Ferrando, 1998: 123). Secondly, even if in most cases X occupies only a minor part of the space delimited by Z, there are cases in which X occupies it almost, albeit not, totally. In "The rock singer in the tight leather pants" (Tyler and Evans, 2003: 182), the rock singer's legs completely occupy the inner space afforded by the pants (but of course do not occupy the space occupied by the leather of pants).

The use of the preposition *in* implies that Z is assigned a spatial, temporal or typological dimension even if it has none: in "I am in love!", "love" assumes a (spatial, temporal or typological) dimension with its boundaries, which it had not originally. Likewise, X can also acquire a dimension that it had not: for example, in "Study with the idea in mind that you will be teaching what you're learning" (COCA), "idea" acquires a spatio-temporal dimension that it had not originally. Moreover, together with the dimension, X acquires the characteristics that the dimension implies (being "in the army" implies specific duties, responsibilities, etc.).

Finally, *in*, while directing one's attention to X as being (partly or completely) inside Z and to what it implies for X to be inside Z, at the same time tends to divert one's attention specifically from what is at the boundaries or outside the space occupied by Z, and from what not being inside Z implies, rather than generally from anything else. For example, "Go out in the rain", while making one's attention focus on the activity of going out in certain weather conditions (and what they imply for the activity), defocuses it specifically from what happens outside of the rain and from what being outside of the rain implies (rather than from what happened yesterday, for example).

From the point of view of the CO underpinning the production of the preposition *in*, what is essentially required is the cognitive capacity to build bounded spatial, temporal or typological spaces, and to operate, orient, move, etc. in them.

3.3. to

The preposition *to* is also one of the most frequently used words in English.[8] Despite the various meanings some scholars assign to this preposition (Chernyshev, 2010; Tyler and Evans, 2003), if we analyze what instructions the preposition *to* provides about the way in which Z determines X, we will realize that *to* invariably instructs one *to mentally develop the construction of X by using Z as the end point of the construction developmental process of X*. As such, Z acts, to use Cervoni's definition of the French preposition *à* (1991: 269), as a "pole", which shows both the direction that the development of the construction of X must take, the final limit of such a development, and the extent of the development (that is, the state, condition, position, duration, etc. that X will take on, attain, reach, etc.).

As Table 5.3 shows, this can be verified for all the main usages of the preposition *to*.

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[8] According to the WFD, the preposition *to* ranks as the twelfth most frequently used word in English.

Table 5.3. Preposition to

Relation/usage as defined by OALD ***sb=somebody, sth=something***	**Example from OALD**	**Z indicates the extent/final limit of the construction developmental process of X by specifying:**
In the direction of sth	Walk to the office	the place where the walking activity ends
Situated in a specified direction from sth	Pisa lies to the west of Florence	a term of reference that helps delimit/define the position of Pisa
Towards a condition, state or quality; reaching a particular state	He tore the letter to pieces	the final state that the letter reaches
As far as sth; reaching sth	The garden extends to the river bank	where the garden ends
Indicating the end of a range	Count from 1 to 10	when counting ends
Until and including a moment in time	From Monday to Friday	the end of the period
Before the start of sth	Only 8 more days to my birthday	the end of a waiting time
Before an exact hour on the clock	Ten to two	when a given time will be finally reached
Used to introduce the indirect object of certain verbs or phrases	He gave it to her sister	the final recipient of the process of giving
Of or belonging to sth/sb; for sth/sb	The solution to a problem	the final beneficiary of the solution
Directed towards or concerning sth/sb	His claim to the throne	the ultimate goal of the claim
Indicating a relationship with sb	She is married to an Italian	the person representing the final connection point implied by the process of marriage
Used to introduce the second element of a comparison or ratio	I prefer walking to climbing	a term of reference that helps delimit a person's preferences
Making a certain value or quantity	There are 2,54 cm to the inch	the reference point to be reached
Indicating a rate	This car does 30 miles to the gallon	a term of reference that helps delimit/define the maximum distance that the car can cover
Indicating a possible range or an appropriate value	20 to 30 years of age	the end of the range of years
In honour of sth/sb	Drink to sb's health	the final beneficiary of the act of drinking

Close enough to be touching sth/sb	Dance cheek to cheek	the final connection point that has been reached
While sth else is happening or being done	She left the stage to prolonged applause	the event used as a reference point to delimit the final course of the action of leaving
Used after verbs of motion (come, go) with the intention of giving sth	Come to our aid	the final beneficiary of the action of coming
Used after words describing feelings towards sb/sth	She is devoted to her family	the final beneficiary of her feeling of devotion
Indicating sb's reaction to sth causing sth	To my surprise the Labour Party won the election	what the result of the election finally implies for a person
Used after verbs of perception (eg. seem, appear), in the opinion of sb; from sb's point of view	It feels like velvet to me	the term of reference used to define the color
Satisfying sb/sth	Her new hairstyle isn't really to my liking	how far a certain hairstyle is from somebody's standard

Some clarifications concerning the term "develop" are in order. Firstly, here "develop" refers to the CO that allow one to further elaborate and work out a given construct, such as when we mentally rotate an object, or imagine the consequences of a certain decision. As such, "develop" does not imply that X, after having been initially constructed, is incomplete, unfinished or imperfect, but rather that X can be further operated on as specified by, or with reference to, Z, and that consequently it can be (spatially, temporally or typologically) characterized for certain qualities, functions, usages, etc., or attain a certain (spatial, temporal, typological) state, condition or position that the original, bare construction of X does not specify. For example, compared to "I walk", which only describes the manner in which the activity is performed, "I walk to the office" also describes the distance that is covered by performing that activity. In "He tore the letter to pieces", Z specifies the state that the letter reaches after having been torn apart. In "I prefer walking to climbing", "It feels like velvet to me" and "Her new hairstyle isn't really to my liking", Z provides the reference point on the basis of which one performs operations of evaluation and assessment of X. In "The notes to a chapter", "Where is the knob to the radio?" and "There is more to it than that", Z specifies the object/entity for which X is intended or can be used or to which it can be assigned (Boulonnais, 2008: 81-83). Consequently, the development of the construction of X entails the appearance of new dimensions or characteristics that, albeit associated with X, must not be confused with it.

Secondly, the development process of X is experienced in a continuous, uninterrupted way to the point defined by Z. This is quite clear if we compare *to* with *for* (Boulonnais, 2008: 152-153; Gruntman, 2011: 206-207; Tyler and Evans, 2003: 146). While "The timekeeper gestured to the

referee" is used in a context in which the timekeeper directs his gesture directly at the referee, without the aid of any intermediary, "The timekeeper gestured for the referee" is used when there is no direct contact and the timekeeper needs the help of an intermediary to contact the referee (Tyler and Evans, 2003: 146).

It can be debated if *to*, in the various constructions using the *to*-infinitive ("He wants to go", "She persuaded him to tell the truth", "To be able to speak openly and freely again was wonderful", "I don't know what to say", "Be happy to see somebody"), is still a preposition. Some linguists argue, mainly on syntactical considerations, that this use of *to* must be distinguished from the use of *to* as a preposition (Boulonnais, 2008; Pullum, 1982), while some others argue that, even when used with the infinitive, *to* is a preposition (Groussier, 1981; Duffley, 2004). I think that in these cases *to* maintains a great part of its original prepositional function, in that it contributes to create an ideal end point, aim or target – represented by Z – for the process expressed by X. This is evident above all when intentions or willingness are expressed. For example, in "She is working hard to earn money for her holiday" (OALD), Z ("earn money for the holidays") specifies the final aim that one wants to achieve by means of X (working hard). However, the tight link between *to* and the bare infinitive, and, above all, the whole construction verb+(object)+infinitive, introduce additional confounding variables in the analysis complicating it a great deal, which calls for supplementary considerations that are out of the scope of the current chapter.

The mental production of the preposition *to* requires, in addition to the attentional and WM operations that are necessary for all prepositions (see Figure 4.1 of the previous chapter), those systems and processes that allow for elaborating and developing mental constructs (memories, perceptions, etc.), such as those that allow for the mental rotation of an object (Kosslyn, 1983) or developing a thought. Moreover, a program is required that makes it possible for this elaboration to end at the final point provided by Z: this program is quite basic for animals, in that it is the same as the one that controls the movements of limbs, and that allows one, for example, to extend an arm to a given target or location in a controlled way.

Some final considerations about the implications entailed by the use of the preposition *to*. Firstly, in order for the mental construction of X to be developed using Z as the end point of such a development, Z must be consistent with X, in the sense that Z must satisfy the constraints imposed by the meaning of X. If for example X describes an activity, Z can specify the spatial location where X ends or occurs, the point in time when X ends or occurs, or the end at which X aims; if X describes a process, Z can provide the end point of X. When Z is a word or construction that is not usually consistent with X, then the use of the preposition tends to make either X or Z assume a new or a different meaning, adapting it to the new role imposed by the prepositional assembling. This can lead to ironic, stylistic, metaphorical, etc. effects. For example, in "To go to the Tomato", the word "Tomato", which usually refers to a vegetable, takes on a different meaning (in this case, that of a certain restaurant).

Secondly, the fact that Z provides the end point of the development of X implies that Z is mentally conceived as preexisting or, at least, independent of X (Boulonnais, 2008: 82). In "The solution to

a problem", the "problem" preexists the solution. Moreover, it is this very fact that allows one to use Z as a reference point to measure or evaluate something.
Thirdly, *to*, while directing one's attention to the process that leads to develop X to the point defined by Z, at the same time tends to divert one's attention specifically from what precedes and follows the process of development of X, rather than generally from anything else. For example, "He gave it to her sister", while making one's attention focus on the act of giving an object to a final recipient, defocuses it specifically from the origin and the fate of the object (rather than from what is happening, for example, in New York now).

3.4. for

Although in some contexts the prepositions *for* and *to* seem to be nearly synonymous, actually they act quite differently (Boulonnais, 2008: 152-153; Gruntman, 2011: 206-207; Lindstromberg, 2010: 226; Tyler and Evans, 2003: 146). For example, by comparing "He ran to the hills" with "He ran for the hills", Tyler and Evans (2003: 146) conclude that while the former "is more likely to be used in a context where reaching the hills is being emphasized, that is, the hills as a primary physical goal or objective", the latter "is more likely to be employed when reaching the hills is a means to an end, rather than the end in itself". In a similar vein, by comparing "appeal to" with "appeal for", Gruntman (2016) concludes that *to* represents a completed movement such that the referent of the noun phrase following *to* is the recipient of the appeal, while with *for* it is not known whether what was appealed for was achieved or not.
In my terms, this can be explained by saying that while *to* makes one experience the development process of X in a continuous way to the point defined by Z, the preposition *for* is neutral about whether X ever actually moves to, reaches and comes in contact with Z (see also Lindstromberg, 2010: 226).
Indeed, when X is a verb, a noun or adjective expressing intention, aim, purpose, desire, request (e.g., verbs: aim, try, pray, plan, struggle, strive, battle, campaign, contend, play, appeal, ask, apply; nouns: plan, proposal, design, request, application, claim, demand; adjectives: suitable, ready, prepared, appropriate), or motion, or the initial phase of an action (e.g., verbs: leave, depart, move, go, start, rush, run, dash), X is usually understood as actually not being in contact with Z, and Z takes the meaning of a desired state or object, an intended function, result or destination (however, when *for* is used to express duration or spatial extension, as in "The road goes on for miles and miles", no such meaning seems to be conveyed).
Linguists tend to attribute the difference between *to* and *for* to the fact that *to* involves an "actual destination or recipient" or "direct effect, influence or impact", while *for* expresses an "intended destination or recipient" or "aimed target".[9]

[9] As Boulonnais (2008) observes, the same difference is found in French for the prepositions *à* and *pour*: "Acheter quelque chose à quelqu'un" vs. "Acheter quelque chose pour quelqu'un". See also the Italian prepositions *a* and *per* : "Comprare qualcosa a qualcuno" vs. "Comprare qualcosa per qualcuno".

Gruntman (2011, 2016) explains this difference by suggesting that *for* implies a *forward movement* leading to a (desired) result, or a resultant situation, with the movement representing a means to achieve the desired end. For example, in "I got a present for you", the gift is meant to move from the speaker, who bought it, to the final recipient, who is the listener; in "They are leaving for London tomorrow", the act of leaving corresponds to the first stage of a movement which is meant to take the people to the final destination of London. This forward movement can lead to a resultant situation in which: (i) X occupies Z's role ("They will employ somebody to do the business for them"); (ii) X accrues to Z ("He voted for the Liberals"); (iii) X obtains Z ("It is all for her good"); (iv) X is of advantage to Z ("Many people only work for the money"); (v) X has the status of Z ("I took his story for truth"); (vi) X is associated with Z as a result thereof ("She thanked her uncle for his letter"); (vii) X is matched or associated with Z ("The technical term for sunburn is erythema"); (viii) X has Z as an attribute ("The weather […] phenomenally severe for the season"); (ix) X achieves the extension corresponding to Z ("The toaster remained on for more than an hour").

According to Gruntman, it is possible to put forward a single potential meaning of *for* that explains all the different resultant situations listed above: *for* represents a movement at the end of which X is brought into association with Z so that X occupies the space belonging to Z (Gruntman, 2011: 203). While agreeing with Gruntman about the monosemantic nature of *for*, I think that the meaning he gives for *for* does not fully account for the cases in which it is Z that replaces X. Consider these two sets of examples:

(a) "Sell a book for 10$" and "Buy a book for 10$" (Boulonnais, 2008: 128): while the former sentence depicts the scene from a *prospective* view leading from X to Z (the book is the starting point of a process of exchange), the latter sentence depicts the scene from a *retrospective* view leading from Z to X (the book is conceived as the end result of a process of exchange);

(b) "Give 10$ for a book" and "Buy a book for 10$": while the result of the exchange is the same for both sentences (one finally gets a book), the former sentence describes the process from a *prospective* view leading from X to Z, while the latter sentence describes the very same process from a *retrospective* view leading from Z to X.

According to Gruntman (2011: 177), the two sentences in (b)[10] can be both explained by saying that "*for* in all these uses represents a movement leading towards a desired end where some object replaces the money paid to obtain it". While this explanation provides an abstract account of the process – as if it were from a third-person point of view –, it does not account for how the process is actually experienced and described by the subject, that is, from a first-person point of view. Moreover, this explanation cannot equally account for the sentences in (a): even assuming the plausibility of the explanation for "Buy a book for 10$", how can it account for "Sell a book for 10$"? The correct explanation should be rather something like: "*For* represents a movement

[10] Gruntman's examples are: "The Due d'Aumale's great work […] for which some of us would gladly give all the novels ever written" and "I bought a book for ten dollars".

leading toward a desired end where a certain amount of money replaces the object that was sold to obtain it", which clearly shows that while in "Buy a book for 10$", X is the desired end result, in "Sell a book for 10$", it is Z that is the desired end result.
The problems posed by Grutman's explanation can be overcome by considering that *for* instructs one *to mentally construct something (A) as a result that is obtained by means of something else (B)*.
More specifically, we have two possibilities. Either:

(1) (A)=X and (B)=Z or
(2) (A)=Z and (B)=X

In the former case, X represents the result of what is obtained by means of Z (i.e., "Buy a book for 10$"), in the latter case, X is the means to the end represented by Z (i.e., "Give 10$ for a book") (more examples are given in Table 5.4).

Table 5.4. Preposition for

Relation/usage as defined by OALD ***sb=somebody, sth=something***	**Example from OALD**	**Z helps define X as:**
Indicating the person intended to receive or benefit from sth	There's a letter for you	a means to communicate something to someone
In order to help or benefit sb/sth	Take some aspirin for your headache	a means to alleviate a disease
As an employee of sb	She works for a publisher	a means to hold a job
Indicating purpose or function	It's a machine for slicing bread	a means to perform a function
Indicating destination or target	Leave for home	a means to attain a destination
Indicating reason or cause; because of sth; on account of sth	He gave me roses for my birthday	a means to celebrate somebody's birthday
With regard to/concerning sb/sth	Anxious for sb's safety	the psychological result of (thinking about) a person
In defense or support of sb/sth	We are campaigning for a bypass round the town	a means to support a cause
As a representative of sb/sth	I am speaking for everyone in the department	a means to represent someone else
Meaning sth	What's the "S" for in A.S. Hornby?	a means to represent something
In order to obtain sth	Go to a friend for advice	a means to obtain an advice

As the price, reward or penalty that sth carries	Buy a book for £3	the result of having spent a certain amount of money
As the replacement of sth else	Exchange one's car for a new one	a means to obtain a new car
In return of sth; in the specified ratio	There is one bad apple for every 3 good ones	the result of a statistical evaluation performed by means of a reference set
Considering what can be expected from sb/sth	It's quite warm for January	the result of an evaluation performed by means of a reference scale
(After a comparative adjective) following sth	You'll feel all the better for a good night's sleep	the result obtained by means of a certain practice
Indicating a length of time	I'm going away for a few days	an activity through which a certain time extension is achieved
Indicating that sth is intended to happen at the specified time	A reservation for the first week of June	a means to make a certain event occur in a certain period
Indicating the occasion when sth happens	I'm warning you for the last time – stop talking!	a means to express that a certain event is occurring
Indicating a distance	He crawled on his hands and knees for 100 meters	an activity that makes it possible to achieve a certain spatial extension
Used after an adjective and before a noun or pronoun + infinitive	It's impossible for me to leave my family	a means that one has to state that one rejects a certain option
Used after a noun and before a noun or pronoun + infinitive	There's no need for you to go	a means that one has to state that something does not apply to his/her interlocutor
Used after *too* + adjective or adjective + *enough*	The box is too heavy for me to lift	a means that one has to state that one cannot perform a certain activity
Used before a noun or pronoun + infinitive to show purpose or design	Letters for the manager to sign	a means that one has to state that something must be done by someone else
Used after *more* with *than*	Nothing could be more pleasant than for them both to get married	a means that one has to state under which conditions something applies to someone else

It can be debated if the *for* which introduces *to*-infinitivals containing a subject (e.g., "It's impossible for me to leave my family", "There's no need for you to go", "The box is too heavy for me to lift", etc.) is still a preposition. Some authors maintain, mainly on syntactical considerations,

that in such cases *for* must be reanalyzed as a semantically empty subordinator or complementizer whose role is to introduce the subject of the infinitive (Boulonnais, 2008; Huddleston and Pullum, 2002), while some others argue that, even when used with the *to*-infinitivals, *for* is not semantically empty but is instead a word with a lexical specification (Gruntman, 2009: 157). According to my analysis (see Table 5.4), it seems quite reasonable to conclude that the *for* which introduces *to*-infinitivals maintains the original meaning of the preposition *for*, because, to use Gruntman's words (2009: 160), it marks the beginning of a "movement" towards a goal or result designated by the *to*-infinitive. As such, as Lindstromber (2010: 226) observes, *for*, unlike *to*, places the emphasis on the direction of a trip rather than on its endpoint, on the desired or intended outcome rather than on its actual achievement. This also explains the element of "uncertainty", "lack of confidence", "lack of control" and "vague possibility" conveyed by the use of the *for*+*to*-infinitival construction compared to the use of the sole *to*-infinitival ("I want very much for you to come" vs. "I want you to come")[11] (see Wierzbicka, 1988: 111-125).

The mental production of the preposition *for* requires, among others, the cognitive abilities to plan a certain activity for the future, such as those that allows one to plan the movement of one's limbs at a given time.

Last, we can observe that the preposition *for*, while directing one's attention to the final result that is achieved through a certain means (specified by either X or Z), tends to divert one's attention specifically from results opposite to or different from that which is achieved through the specified means, rather than generally from anything else. For example, "Adultery is grounds for divorce", while making one's attention focus on a consequence of adultery, defocuses it specifically from another possible consequence (e.g., "regret").

3.5. with

Generally speaking, the preposition *with* conveys the idea of two entities (X and Z) that are somehow united, even if they seem to maintain a certain independence from each other. This can be observed quite well by comparing a PA (5.5b and 5.6b) with a noun-adjective phrase (5.5a and 5.6a):

(5.5) a. Savory chicken vegetable soup goes a long way for little money (COCA).
b. This wonderful chicken soup with vegetables (COCA).
(5.6) a. Beth drives down a shady, tree-lined avenue (COCA).

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[11] An element, this one, that also motivates, or is anyway strictly connected to, the fact that the *for*+*to*-infinitival construction differs radically from the *to*-infinitival construction in requiring non-coreferential subjects ("She was keen to go" versus "She was keen for him [*for herself] to go"). As Wierzbicka (1988: 123) observes, "*to* implies […] coreferentiality between the addressee and the intended agent, whereas *for to* implies that the intended agent is different from the addressee" and "coreferentiality is linked with a firm expectation of effectiveness and both are signalled by *to*, whereas non-coreferentiality is linked with a weak expectation of effectiveness, and both are signalled by *for*".

b. Rua Tiradentes, a wide avenue with trees down the center (COCA).

In (5.5a), while the soup and the vegetables (together with the chicken) form a single, coherent whole, the vegetables in (5.5b) clearly appear as a distinct (perhaps even minor) component of the soup. Likewise, for (5.6a) and (5.6b): while in (5.6a) the trees are perceived as inseparable from the avenue, in (5.6b) the trees are perceived as a distinct and subsidiary element of the avenue.

In this sense, *with* bears a certain resemblance with the conjunction *and*, in that the elements assembled by *and* maintain their own independence. However, what the independence expressed by *and* implies is quite different from what the independence expressed by *with* implies. In "I saw John and Mary", the conjunction *and* does not necessarily express the idea that I saw them at the same time or in the same place: I might have seen first one at one place and then the other at another place. On the contrary, "I saw John with Mary" expresses the idea that I saw them both at the same time.

According to my analysis, this is explained by the fact that *with* instructs one *to mentally associate the construction of X with the concurrent construction of Z, so that the construction of the former cannot occur if the construction of the latter does not occur*. By saying "cannot occur", I do not mean that one is not able *in general* to mentally construct X independently of Z (actually, it is a basic principle of mental activity that one can always mentally construct whatever one wants in whatever condition); rather, what I mean is that the use of *with* requires *specifically* that the construction of X is made dependent on the concurrent construction of Z. Neither do I mean that the constructions of X and Z merge into one sole construction; rather, the two constructions proceed in parallel in a coordinated way, which ensures their partial independence ("partial" because in any case the construction of X depends on the construction of Z).

The instructions provided by *with* make X become characterized or qualified by the additional presence, action, function, support of, or conditions, reasons etc. of what Z refers to (see the examples of Table 5.5, which offers an overview of the various kinds of characterization/qualification produced by Z).

Table 5.5. Preposition with

Relation/usage as defined by OALD ***sb=somebody, sth=something***	**Example from OALD**	**X is characterized/qualified via the concurrent construction of Z, which defines:**
In the company or presence of sb/sth	I went on holiday with a friend	the person who accompanied the speaker
In the care, charge or possession of sth	I left a message for you with your secretary	who takes care of the message
Having or carrying sth	A girl with red hair	the girl's distinctive feature

Indicating the tool or instrument used	Feed the baby with a spoon	the instrument used to perform the activity
Indicating the material or item used	Fill the bowl with water	the material used to perform the activity
Agreeing with or supporting sb/sth	Are you with us on this issue?	who supports (or does not support) the speaker
In opposition to sth; against sth	Fight with sb	the opponent in the fight
Because of sth; on account of sth	Tremble with fear	the reason motivating the feeling
Indicating the manner, circumstances or conditions in which sth is done or takes place	She sleeps with the window open	the conditions in which the activity takes place
In the same direction as sth	Sail with the wind	the conditions in which the activity takes place
Because of and at the same rate as sth	Skill comes with practice	the manner in which skill is acquired
In regard to, towards or concerning sb/sth	Angry with the children	who the object of the feeling is
In the case of sb/sth; as regards sb/sth	It's a very busy time with us at the moment	the people for which the busy state holds
And also sth; including sth	The meal with wine came to £15 each	the additional component of the meal
Being an employee or a client of an organization	He is with ICI now	the company he works for
Indicating separation from sb/sth	I could never part with this ring	the object from which the speaker will never separate himself
Considering one fact in relation to another	She won't be able to help us with all her family commitments	the reason hindering the possibility of helping
In spite of sth; despite sth	With all her faults I still love her	the conditions in which the feeling still remains
Used in exclamations	Down with the Tories!	whom the speaker is against

The specific kind of link between X and Z that *with* establishes helps to create various senses, which the context helps to define each time. Firstly, the sense of simultaneity of two events, which is clearly evident in sentences such as "The pressure varies with the depth" (Rapoport, 2014: 160). Secondly, the sense of possession that is quite apparent when *with* is used in a context referring to whole+part or person/thing+feature ensembles, such as "A man with a tattoo" (Lindstroberg, 2010: 215-216), in which X would not be the same without Z, because Z is a constituent of X. Thirdly, the sense that the destiny of X is somehow linked to the destiny of Z (and vice versa). For example, in "The workers planted the garden with trees", the life of the trees is linked to the life of the whole

garden: if buildings supplant the garden, (most of) the trees will be uprooted. It is interesting to observe that this sense is also elicited by some other prepositions: compare, for example, "The workers planted the trees in the garden" (Rapoport, 2014: 164). It should be noted, however, that each preposition sets its own constraints on the PA. For example, the use of *in* always requires that (at least part of) X is contained by Z. *With* does not (always) imply this requirement: in fact, sometimes X contains Z ("Fill the bowl with water"), some other neither X contains Z, nor Z contains X ("I live with my parents").

Finally, *with*, while directing one's attention to the parallel, interlinked presence of X and Z, by means of which Z qualifies X, tends to divert one's attention specifically from what constitutes, belongs to, or is implied by X, but is not affected by the link between X and Z, rather than generally from anything else. For example, "A girl with red hair", while making one's attention focus on the girl's characteristic hair, defocuses it specifically from other features of the girl (for example, her eyes), rather than from, for example, what the radio is broadcasting.

The mental production of the preposition *with* is specifically underpinned by the capacity to coordinate different activities that are performed in parallel, such as those we perform when using both our hands.

3.6. on

Most of the uses of the preposition *on* indicate that two entities (X and Z) are in physical contact and that one of them (Z) serves as a support for the other. This is clearly evident in sentences such as "The book on the table" (Lindstromberg, 2010: 51). This applies regardless of the axis (e.g., vertical, horizontal) along which X and Z are arranged ("The book on the table" vs. "The mirror on the wall") and of the orientation (e.g., upward, downward) of Z ("The book on the table" vs. "The bug on the ceiling"). Usually, Z is larger than X and the support it offers is represented by a part of its border or by a part of its external surface.

As such, Z is typically represented by entities having an extended or large surface, such as geographical locations (e.g., mountains and hills), the ground in general (e.g., the floor and land), bodies of water (e.g., the sea), paths in general (e.g., roads and railways), vehicles (e.g., cars, trains and ships) or other objects and artifacts (e.g., chairs and tables).

It should be noted however that not always does *on* express a *physical* contact between two entities: sometimes *on* may express just a motion toward something, which does not imply any actual contact, as in "His troops were preparing to march on Shanghai" (COCA) and "The old man turned on her" (Navarro i Ferrando, 1998: 198). Moreover: Z does not always act as an actual support, as in "The clouds on the island" (Herskovits, 1986: 146) and "A dog on a leash" (Herskovits, 1986: 144); what Z offers is sometimes a line rather than an actual surface, as in "The earth rotates on its axis" (Navarro i Ferrando, 1998: 186) and "The laundry on the line" (Herskovits, 1986: 140); not always is Z larger than X, as in "She remained squatting on her heels all the time" (Navarro i Ferrando, 1998: 186) or "The man on his back" (Herskovits, 1986: 146); between X and Z there

can be more than mere physical contact, as when X is actually a part of Z, as in "[…] could still see the friendly grin on the young, sun-browned face" (Navarro i Ferrando, 1998: 202).

Therefore, the notions of physical contact, surface and support are not always useful in accounting for the meaning of *on*. This means that such notions are to be considered a product of the PA rather than constituents of the meaning of *on*, and that the various usages of *on* must be based on a very general cognitive mechanism.

Indeed, if we analyze the instructions provided by the preposition *on*, we will realize that *on* invariably instructs one *to mentally apply X to Z*. The act of mentally applying something to something else is a very basic mental operation, which has its original prototype in the act of applying one's own attention to something, whether it is one's own sense organs (in which case, verbs such as "listen" and "look" are used), the products of the activity of one's own sensory organs (in which case, for example, one "hears something" or "sees something"), one's memory system (in which case, one "remembers" something) or something else. Another relevant application of this basic operation is the implementation of one's own conscious intentions, that is, when one decides to put one's intentions, plans, ideas, etc. into practice by applying them, for example, to one's own motor system in order to move, act, speak, etc.

The act of applying X to Z conveyed by *on* can be performed for various reasons: from the least demanding in terms of what the application of X to Z is expected to produce (as in "The clouds on the island", where the mental application seems to be used to just express the copresence of two entities) to the most demanding ones (as in "A tax on tobacco", where the application is expected to produce a specific monetary outcome).

The act of applying X to Z can result in a real physical contact ("A picture on the wall"), a physical movement ("The old man turned on her"), a conceptual activity ("My theory on a related subject", COCA), and so on. This result is very much determined by Z, in the sense that it is Z that specifies to which kind of entity or event X is applied. Table 5.6 offers an overview of the various possible ways in which Z qualifies X.

Table 5.6. Preposition on

Relation/usage as defined by OALD ***sb=somebody, sth=something***	**Example from OALD**	**Z qualifies X by specifying that the kind of application of X to Z is:**
In or into a position covering, touching or forming part of a surface	A picture on the wall	physical-spatial
Supported by or attached to sb/sth	A roof on a house	physical-spatial
In or into a large public vehicle	Travel on the bus	physical-spatial
Being carried by sb; in the possession of sb	The burglar was caught with the stolen goods on him	physical-spatial
Indicating a time when sth happens	On Sunday	temporal

At or immediately after the time or occasion of sth	On my arrival home, I discovered the burglary	temporal
About sth/sb	Speak/write on Shakespeare	literary
Indicating membership of a group or an organization	Which side are you on? (Which of two or more different views do you support?)	conceptual-theoretical
Eating, drinking regularly	Live on bread and water	material-categorical
Indicating direction towards sb/sth	On the left you can see the palace	spatial
At or near a place or time	A town on the coast	spatial
Indicating a basis or reason for sth; as a result of sth; because of sth	A story based on fact	empirical
Supported financially by sb/sth	Live on a pension	material
By means of sth; using sth	Play a tune on the flute	instrumental
Indicating an increase (of cost)	A tax on tobacco	categorical
With regard to sb/sth; so as to affect sb/sth	A ban on imports	categorical
Compared with sth/sb	This month's unemployment figures are 20k up on last month	statistical
Indicating an activity, a purpose or a state	On business/holiday	categorical
Indicating a telephone number by which a person may be contacted	You can phone on 003456799	numerical
In addition to sth; following sth	Suffer disaster on disaster	psychological

Z, by specifying the kind of entity or event to which X is applied, implicitly indicates what it means for X to be applied to Z. For example, in "Travel on the bus" (OALD), "the bus" qualifies the act of travelling as occurring in a certain way, which distinguishes it from other ways of travelling (e.g., ship, plane, metro). Likewise, in "Live on bread and water" (OALD), "bread and water" qualifies the kind of life one is living, which is different from other kinds of life.

The use of *on* has some important implications. The act of applying X to Z firstly conveys the idea that X and Z are somehow separate, that is that they are two distinct entities, parts or objects, even if this is actually not always the case ("A beauty spot on her puffy nose", COCA). Secondly, it conveys the idea that X is somehow external to Z, and that the application primarily occurs on or affects some external part of Z. Thirdly, it conveys the idea that Z is a clearly identified, self-contained entity: as such, Z is dimensionally defined by having a certain extension, duration, structure, etc.[12] Fourthly, if Z is larger than X, it conveys the idea that the application of X to Z only affects a limited area of Z.

[12] In her study on the use of *on* in temporal expressions, Wierzbicka (1993) also highlights this aspect. However, she adds that *on* is incompatible with duration and that it cannot co-occur with nouns which by virtue of their semantics imply wholes composed of many parts, that is, with the names of periods of time (such as "period",

The use of *on* further implies the idea that the destiny of X is linked to the destiny of Z (unless Z refers to an event that has already reached its conclusion): if you are travelling on a plane, and the plane falls, you fall with it.
Finally, *on*, while directing one's attention to X as applied to Z, and to what it implies for X to be applied to Z, tends to divert one's attention specifically from what is beneath or beyond the area or surface where X is applied to Z, rather than generally from anything else. For example, "A picture on the wall", while making one's attention focus on where the picture is and what it implies for it to be there, defocuses it specifically from what is inside the wall.

3.7. at

The preposition *at* is frequently associated with the concept of *coincidence* between two entities, but also with the concepts of *point* or intersection between two lines (Boulonnais, 2013; Herskovits, 1986; Navarro i Ferrando, 1998; Tyler and Evans, 2003).[13] According to my analysis, this is due to the fact that the preposition *at* invariably instructs one *to assign the position that Z occupies in a certain domain to X* (Table 5.7 provides examples of some possible domains). In other words, Z indicates the *exact* position that X must occupy in the given domain.

Table 5.7. Preposition at

Relation/usage as defined by OALD ***sb=somebody, sth=something***	**Example from OALD**	**Z provides the exact position that X occupies in the domain of:**
A point in space	At the corner of the street	space
With the name of a building, especially to refer to what is happening inside	She is at the theatre	space/events
Indicating presence at an event	At a concert	events
Indicating a place of employment/study	She is at Oxford University	employment/ study
With the name of a person + 's to refer to that person's home/place of work	I was at my father's	places
An exact point in time	Start at 2 o'clock	time

"year", month", "century"). I find this qualification quite implausible. Firstly, contrary to what Wierzbicka maintains – "Thursday is not the name of a period of time; rather it is the name of a simple, indivisible entity" (Wierzbicka, 1993: 446) –, the days of the week *do* identify a period of time lasting twenty-four hours. Secondly, the days of the weeks are also composed of parts (morning, noon, afternoon, night).

[13] This aspect has also been highlighted for prepositions sharing a similar meaning in other languages: for the French preposition *à*, see Cervoni (1991); for the Italian *a*, see De Felice (1960), Ceccato (1974) and Salvi and Vanelli (2004).

A period of time	At night you can see the stars	time
The age at which sb does sth	She got married at 55	time/age
In the direction of or towards sb/sth	Throw stones at the can	objects
After a verb to show that sb tries to do sth, or partly does, but does not succeed	I could only guess at the meaning of the sign	meanings
Indicating the distance away from sth	Can you read a car number-plate at 50 metres?	distance
Indicating a state, condition or continuous activity	Our country is now at war	state/condition
Indicating a rate, price, speed	House prices rose at a higher rate than inflation	rate
Indicating order or frequency	At the first attempt	sequence of events
In response to sth	Attend the dinner at the chairman's invitation	social relationships
With her/his/our etc. + a superlative adjective	The garden is at its most beautiful in June	state/condition
After many adjectives and nouns	Good/clever/skilled at chess	games

If X is a person or an object, this may result in X being positioned in a specific place in space ("She is sitting at the table in the corner", CD), in a specific point in in time ("I am busy at the moment", "The bells ring at regular intervals through the day", CD), at a specific event ("We spent the afternoon at a football game", CD), in a specific company, etc. ("He has been at the bank longer than anyone else", OALD) or in a specific condition or state ("Put somebody at risk", OALD; "The country was at peace", OALD). With verbs expressing a subject's movement or focusing towards something or someone (such as aim, gaze, look, run, rush, shoot, slap, smile, spit, stare and throw), the position indicates the exact orientation, direction, etc. of X ("Look at me!", "She aimed at the target", CD). With other kinds of activities, this may result in X being positioned on a given point on a scale that indicates rate, speed, frequency, etc. ("He was driving at 120mph when the police spotted him", "Inflation is running at 5 percent", CD). If X is a psychological state (such as surprise, disappointment and excitement), the position may indicate what causes or originates it ("We were surprised at the news", CD). If X expresses an evaluation or judgement (such as good, bad and hopeless), the position may indicate what it is that is judged or evaluated ("I was never very good at sports", CD).

The fact that Z provides the *exact* position that X must occupy in the given domain, distinguishes the preposition *at* from the preposition *by*, the use of which does not always and necessarily provide an exact position of X ("A house by the church" does not provide an exact indication of the position of the house). As we will see, this is because *by* makes Z provide a *general* reference system, which sometimes only allows for approximately inferring the characteristics of X.

Despite occupying the same position in the domain, X and Z remain two separate entities: if one is "at the theater", one finds oneself where the theatre is, but one is not the same entity as the theatre. In this view, *at* resembles *on*. However, differently from *on*, the preposition *at* conveys neither the idea that X is somehow external to Z, nor that Z has necessarily any dimension, such as duration or extension (Wierzbicka, 1993).
As it happens with *on*, the use of *at* makes X inherit the properties that are usually associated with occupying a certain position in a certain domain. "Getting married at 55" implies certain things that "Getting married at 22" does not imply, and vice versa: for example, at 55 a lady can no longer have children. To be "at the gym" implies certain things that being "at home" does not imply: at the gym usually one does not cook, cut the grass, etc.
Finally, the preposition *at*, while directing one's attention to what it implies for X to be assigned with the position provided by Z, tends to divert one's attention specifically from what it implies for X to be assigned with the position provided by an entity (object, event, activity) other than Z, and for Z to assign its position to an entity other than X, rather than generally from anything else. For example, "Good at chess", while directing one's attention to the subject's ability to play chess, defocuses it specifically from other abilities of the subject (e.g., "Good at football"), rather than from, for example, where the subject has planned to spend his holidays.

3.8. by

According to some linguists, the preposition *by* conveys as disparate meanings as space (static: "Live by the sea" or dynamic: "She needed to go by the bank and sign the paper"), time ("The work must be finished by May 1"), means ("It's impossible to get there by car"), manner ("clean by scrubbing"), rate and amount of change ("Student complaints are rising by 10% a year", "Multiply x by y"), agent in passive construction ("Made by a robot") and reason/cause ("I'm delighted by your optimistic feelings") (all the examples are from Lindstromberg, 2010).
As we have seen with the prepositions considered so far, the variability of the meanings of a PA is produced by X and Z, and cannot be ascribed to the preposition. This also holds for the preposition *by*, which invariably instructs one *to determine the characteristics of X on the basis of the reference provided by Z.* More precisely, Z "represents" a reference system, in the sense that it is a point or part belonging to a more general and comprehensive reference system (in "A house by the church", "church" stands for a specific point in space). As such, Z allows one to estimate or infer the qualities, attributes, properties etc. that characterize X in relation to that reference system.[14]
As Table 5.8 shows, Z can provide various kinds of reference (spatial, temporal or typological). According to the reference it provides, Z helps determine various kinds of characteristics of X. For

[14] An interesting analysis of the preposition *by* is offered by Col (2008). Even if Col does not explicitly refer to a "reference system", he seems to imply it when he argues that *by* provides the (upper or lower) spatial, temporal, etc. limits that allows for qualifying X.

example, in “A house by the church”, “the church” provides a specific location that helps determine the spatial position of the house; in “By this time next week we’ll be in New York”, “by this time” provides a temporal reference that helps determine when the subject will be in New York; in “The room is heated by gas”, “gas” provides a reference based on the typology “fuel” (which includes wood, coal, gas, etc.) that helps determine how the room is heated; in “A church designed by Wren”, “Wren” provides a reference based on the typology “architects” (which includes the names of all architects) that helps determine who designed the church; in “6 multiplied by 2 equals 12”, “2” provides a numerical base that helps determine how many times 6 must be added to itself; and so on.

Table 5.8. Preposition by

Relation/usage as defined by OALD *sb=somebody, sth=something*	**Example from OALD**	**The kind of reference provided by Z is:**	**The reference provided by Z helps determine:**
Near sb/sth	A house by the church	spatial	the spatial position of the house
Who or what does (after a passive verb)	A church designed by Wren	typological: architects	which architect designed the church
With the action of doing sth	Let me begin by saying	typological: activities	how the subject begins his speech
Through the means of sth	The room is heated by gas	typological: fuel	what heats the room
Because of sth, as a result of sth	Meet by chance	typological: likelihood	what occasioned the encounter
Indicating a means of transport or a route taken	Travel by bus	typological: vehicles	what means of transport one uses
Not later than a specified time	By this time next week we’ll be in New York	temporal	when the subjects will be in New York
Past sb/sth	I go by the church every morning on my way to work	spatial	what trajectory the subject follows
Passing through sth	He entered by the back door	spatial	from where the subject entered
During sth	Travel by day	temporal	when one travels
To the amount or extent specified	House prices went up by 10%	typological: statistics	how much prices increased
From what sth shows, according to sth	By my watch it is 2 o’clock	temporal	what time it is

From what sth says	By law, you are a child until you are 18	typological: rules	what the legal capacity of a person is
Indicating a part of the body or an item of clothing held, etc.	Take sb by the hand	typological: body	which part of the body one takes
Indicating a standard period or quantity	Pay sb by the day	temporal-periodical	the frequency of payment of the salary
At the rate or in the groups specified	Improving day by day	temporal-periodical	the rate of improvement
Used for giving more information about sb's background	A lawyer by profession	typological: social condition	somebody's background
In the name of sb/sth	I swear by Almighty God	typological: sacred or trusted entities-objects	on what one swears
Showing the measurements of sth	The room measures 15 feet by 20 feet	spatial-numerical	the number of times 15 must be added to itself
When multiplying or dividing	6 multiplied by 2 equals 12	typological: numbers	the number of times 6 must be added to itself

It is important to note that X is usually represented by a complex construction based on a verb, which can be either explicitly stated or implied.

The preposition *by*, while directing one's attention to how Z qualifies, contextualizes or constrains X, tends to divert one's attention specifically from plausible alternatives to Z, and what they allow to infer about X, rather than generally from anything else. For example, "A house by the church", while directing one's attention to where the house is relative to the church, defocuses it specifically from the position inferred from a building other than the church (e.g., "A house by the school"), rather than from, for example, the color of the house.

The mental production of the preposition *by* requires, among others, the cognitive abilities to produce and use reference systems in order to evaluate the characteristics of entities and events.

3.9. over

Over is one of the prepositions that has been most widely studied in order to describe its meaning(s) (see for example: Brenda, 2014; Col and Poibeau, 2014; Deane, 2005; Lakoff, 1987; Tyler and Evans, 2003; Van der Gucht *et al.*, 2007). Most semantic studies enumerate various meanings for *over*: Lakoff (1987) describes more than one hundred meanings; Tyler and Evans (2003) list fifteen different senses. Very few studies put forward a monosemantic account of *over* (Col and Poibeau, 2014; Van der Gucht *et al.*, 2007).

Quite often, linguists try to define the meaning of *over* by comparing the use of *over* with other prepositions in a spatial context. However, this method does not seem to bring to any conclusive result.

For example, Tyler and Evans (2003: 110-112) observe that *over* can sometimes be used interchangeably with *above* ("The picture is over the mantel"≈"The picture is above the mantel"), but that they cannot be considered as synonymous ("Nora twirled over the polished floor"≠"Nora twirled above the polished floor"), because *over* implies that the TR (trajectory) is within potential reach of the LM (landmark), while *above* emphasizes an unbridgeable distance between the TR and the LM, such that the TR is not within potential reach of the LM. However – as Tyler and Evans (2003: 113, 120) themselves are forced to admit –, there are cases in which *above* also denotes contact between the TR and the LM: "Is this the box you want? No, not that box, the one above it".

In some cases, *over* seems to differ from *on* because the latter requires that the TR is in adjacent contact with the LM, while the former requires that the TR is not in contact with the LM but only proximal to it, as in "The fly is on the table" vs. "The fly is over the table" (Talmy, 2005: 215). However, there are cases in which *on* does not imply any contact between the TR and the LM ("The clouds on the island") and cases in which *over* does imply a contact between the TR and the LM ("There are peas all over the table", Brenda, 2014: 228).

Furthermore, Col and Poibeau's statistic (2014) performed on a corpus of 346 utterances shows that the semantic values of *over* related to a spatial meaning (i.e., above-and-beyond, on-the-other-side-of, above) amount only to about 20% of the whole sample, and do not prevail over the other values they identified (scanning of an interval, topic, more, control, full covering, scattering, completion, transfer, divider, reflexive, examining and repetition).

In sum, purely spatial considerations are unable to account for the various meanings that a PA can take on when *over* is used.

Once again, this shows that mistaking the product (whether spatial, temporal or else) of the usage of a preposition with the meaning of the preposition itself does not get us anywhere as far as the analysis of the latter is concerned.

As Col and Poibeau (2014) correctly observe, it is the interaction between the linguistic unit and the contextual elements that make the various meanings emerge. In their view, any linguistic unit provides only one instruction, which remains independent of any particular context. As far as the linguistic unit *over* is concerned (their analysis of *over* includes its usage as a preposition, a particle and an adverb), they put forward a very interesting analysis of the instructions it provides: "*Over* convokes a bounded domain and evokes a movement of covering of the domain, its bounds included".[15] Importantly, as they explain, the notions of covering, domain and bound are to be understood as topological, thus encompassing spatiality, temporality and more abstract meanings.

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[15] As Col *et al.* (2012: 157-158) explain, the operations of *convocation* and *evocation* define the way in which each linguistic unit interacts with its context (enunciative environment) and with its co-text (textual environment) to

Col and Poibeau (2014) examine the different meanings that the instructions provided by *over* contribute to build. Let us see some of their analyses.

As far as the "on-the-other-side-of" semantic value is concerned, they observe that the bounded domain can be spatial as well as of another kind. An example of the former is "Go over the bridge and turn right immediately onto a track leading into the trees", where the bounded domain is the space under the bridge delimited by both ends of the bridge itself. An example of the latter is "The day Ruth walked out of this family – when she went over to the Roman Church – she cut herself off from us", where the bounded domain is a conversion journey delimited by two entities, "family" on the one hand and "Roman Church" on the other. The covering process entailed by *over* means to go from one side of the bounded domain to the other, be it the banks of a river or different religions.

As for the "above-and-beyond" semantic value, the bounded domain is generally spatial or geographical, as in "He could see over the tops of the trees of the demesne; over bog and river and plain to the distant Partry mountains", where the bounded domain is represented by the "the tops of the trees". However, the bounded domain can also be something physical, like a quantity of noise delimited by a sound level: "Inside I am delirious, but then comes the bombshell. Ma turns to me and, shouting over the screams, says: 'Let baby have your spoon, dear, there's a good boy'". The "above-and-beyond" value implies that one of the bounds is not merely covered but actually exceeded: in the former example, the gaze covers the trees *up to* the distant Partry mountains; in the latter example, Ma can be heard once her shouts exceed the sound level of the screams.

In the "scanning-of-an-interval" semantic value, the domain is generally temporal and corresponds to a period of time that is covered by some event or process: "The process has evolved over the decade with the linking up of what used to be short runs into long, cross-country routes", but it can also be spatial, as in "If it is transported over long distances, it can be dangerous", where the domain is the distance covered by the goods.

In the "repetition" semantic value, the bounded domain is the process of repeating some action or motion, which is covered more than once, as in "Taking out of his pockets whatever might be in them – keys, pencil, purse, or pen-knife – and laying himself parallel with the edge of the hill, he actually descended turning himself over and over till he came to the bottom".

Adopting Col and Poibeau's insightful analysis (2014), we can say that *over* invariably instructs one *to assign X with the capacity to mentally encompass part of the bounded domain represented by Z, its bounds included*.

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play its construction role. The operation of convocation determines the elements that need to be present in the intersubjective field so that the unit can play its role in the construction. The operation of evocation refers to what the unit brings to the construction when interacting with other linguistic units. For example, the French preposition *dans* "convokes two elements on the verbal scene, EX and EY, such as EY is constructed as a bounded area liable to function as a localization for EX; *dans* evokes a relation of localization of EX by the interior of EY".

The mental operation of partly encompassing something has one of its most prototypical examples in the capacity to diffusely deploy attention on a global scale (rather than on a local element).
The encompassment can occur dynamically, as when one moves from one side of a place to the other ("Run over the glass", OALD), or statically, as when an object covers a person or another object ("They held a large umbrella over her", OALD); can refer to the function performed by an object rather than to the object itself, as in "There was a lamp over the table", where the encompassment refers to the light that the lamp sheds on the table; can lead to or imply either a continuous covering of the domain, as in "Spread a cloth over the table", or a discontinuous one, as in "Zeppelins of World War One by Wilbur Cross, tells of the little-known aerial battles that took place over England during the Great War" (Col and Poibeau, 2014), which implies that the battle took place over different parts of England in different times.
Table 5.9 offers an overview of the various ways in which the partial encompassment of Z by X can occur and what it indicates.

Table 5.9. Preposition over

Relation/usage as defined by OALD ***sb=somebody, sth=something***	**Example from OALD**	**The encompassment of Z by X indicates:**
Resting on the surface of sb/sth and partly or completely covering them/it	Spread a cloth over the table	the area covered by the cloth
In or to a position higher than but not touching sb/sth; above sth/sb	There was a lamp over the table	the area where the lamp sheds its light
From one side of sth to the other: across sth	A bridge over the river	the extension of the bridge
On the far opposite side of sth	He lives over the road	the route one must follow to locate a person
So as to cross sth and be on the other side	Climb over a wall	the path one follows (to reach a place, to escape from sth, etc.)
In or on all or most parts of sth/a place	Snow is falling all over the country	the area where the snow falls
More than a specified time, amount, cost	Over 3 million copies sold	the amount that was exceeded
Indicating control, command, or authority	He has little control over his emotions	the range of mental states one is not able to fully control
Indicating the passing of time while doing, having, etc. sth; during sth	Discuss it over lunch	the period when something can be discussed

Throughout a period, during sth	We shall be away over Christmas and the New Year	the period when one is absent
Past a particular, difficult stage or period	We are over the worst of the recession	that the period of recession has come to an end
Because of or concerning sth; about sth	An argument over money	the topic of the discussion
Transmitted by sth; on sth	We heard it over the radio	where the news one hears comes from
Louder than sth	I could not hear what he said over the noise of the traffic	the noise level that one tries to exceed

The preposition *over*, while directing one's attention to the zone of the domain of Z encompassed by X, and the possible effects/implications that such an encompassment has, tends to divert one's attention specifically from what stays beyond, below or above the (spatial, temporal or typological) zone delimited by the encompassment, rather than generally from anything else. For example, "He could see over the tops of the trees", while directing one's attention to the area covered by the gaze, which is limited by the tops of the trees, defocuses it specifically from what stays, for example, below or behind the trees.

3.10. against

Lindstromberg (2010: 183) observes that *against* is used to express the notions of firm and forceful contact and opposition. As such, it differs from *on* in that *on* is used to convey the idea that X is purely attached to or supported by Z (e.g., "A mirror on a wall"). Moreover, *against*'s notion of force makes it more vivid than *on* in any context where both can be used with more or less the same meaning ("Push against the door" vs. "Push on the door") (Lindstromberg, 2010: 185). *Against*'s notion of force also distinguishes *against* from *at*, even though sometimes they seem to be interchangeable ("They threw stones against/at the glass"), because *at* has actually nothing to do with force (like in "smile at") (Lindstromberg, 2010: 187).

However, it should be noted that *against*'s notion of force does not necessarily involve intentionality on X's side: "My bike is leaning against the side of the house" (COCA). Moreover, not always does it imply a *physical* kind of force: "The skier's red clothes stood out clearly against the snow" (OALD).

According to my analysis, these characteristics can be explained by considering that *against* invariably instructs one *to make X exert its action on Z.* It goes without saying that a precondition of this instruction is that X is assigned the capacity to exert its action. The kind of action that X exerts is determined by the level at which X and Z are made to interact. For example, in "Put the chair against the wall", X is made to interact with Z at the physical level, therefore the kind of action exerted by X is physical; in "I wish to protest strongly against the proposed plan", X is made to interact with Z at the social/cultural level, therefore the kind of action exerted by X is

social/cultural; in "You may also be able to offset losses against gains", X is made to interact with Z at the financial level, therefore the kind of action exerted by X is financial (the examples are quoted from Lindstromberg, 2010; some other examples are visible in Table 5.10).

Table 5.10. Preposition against

Relation/usage as defined by OALD *sb=somebody, sth=something*	**Example from OALD**	**X is made to interact with Z at the:**
In opposition to/contrary to sb/sth	Fight against enemy	physical/social level
Not to the advantage or favour of sb/sth	The evidence is against him	logic level
Close to, touching or striking sb/sth	He was leaning against a tree	physical level
In order to prevent sth occurring or to reduce the arm or loss caused by sth	Take precautions against fire	physical level
In contrast to sth	The skier's red clothes stood out clearly against the snow	color level
In relation to sth; in comparison with sth	Balance/weigh the advantages against the cost	economic level
In return for sth	What's the rate of exchange against the dollar?	economic level
In relation to sth so as to reduce or cancel it	Allowances to be set against income	financial level

The use of *against* has some important implications. Firstly, both X and Z are conceived as two separate, independent entities. Sometimes, Z is conceived as not only passively resisting to an external action but also as actively exerting its own action ("Sail against the tide").
Secondly, X and Z are conceived as interacting only at one level, that is, the level at which X exerts its own action: the other possible levels of interaction are not taken into consideration. For example, in "The skier's red clothes stood out clearly against the snow", the red clothes and the snow interact only at the level of the light, not at other levels (e.g., temperature).
Thirdly, the preposition *against,* while directing one's attention to the nature or typology of action exerted by X on Z, tends to divert one's attention specifically from either X exerting the same kind of action on something/someone other than Z or X exerting a different kind of action on Z, rather than generally from anything else. For example, "We have insured the car against fire", while directing one's attention to the kind of action that is taken to avoid or mitigate expenses that may result from car fire, defocuses it specifically from something different from the fire (e.g., "theft" or "accident") rather than from, for example, the reason why one buys a car.

3.11. without

The preposition *without* has two meanings. The primary and most frequent meaning is usually defined as a negation: for example, CD defines *without* as "not having or doing something" and "not having the use or help of".

As Benedetti's analysis shows (2011: 23), negation is produced by first mentally representing the positive event and then – after having compared the positive representation with the actual event – attentionally discarding it[16] (Benedetti's analysis finds partial support in the empirical studies of Kaup *et al.* [2006, 2007] and Dudschig and Kaup [2018], which show that the negation process takes place in two steps: in the first step, the positive – to-be-negated – information is activated; in the second step, the positive information is rejected and replaced by the negated information).

Therefore, adopting Benedetti's analysis, the cognitive process underlying the production of the preposition *without* can be explained as a two-steps process. During the first step, the *positive* event/scene, that is the event opposite to what the PA describes, is mentally represented; during the second step, the positive event is replaced with its *negative* counterpart by discarding Z. For example, in order to produce/understand the sentence "A whole night without sleep" (OALD), one must first mentally represent the positive event "One usually sleeps at night", and then replace it with its negative counterpart by discarding "sleep"; similarly, to produce/understand the sentence "Cristah Wallace said she is sad without her best friend" (COCA), one must first mentally represent the positive event "Cristah Wallace is happy when her best friend is with her", and then replace it with its negative counterpart by discarding "her best friend"; to produce/understand the sentence "I'm having problems without my computer" (adapted from CD), one must first mentally represent the positive event "To work well, I must use my computer", and then replace it with its negative counterpart by discarding "my computer" (see also the other examples given by OALD in Table 5.11).

Table 5.11. Preposition without

Relation/usage as defined by OALD *sb=somebody, sth=something*	**Example from OALD**	**The positive representation which constitutes the presupposition on which the PA is based**
Not having, experiencing or showing sth	Two days without food	One eats during the day
In the absence of sb, not accompanied by sb/sth	He said he couldn't live without her	He can live only if she stays with him

[16] As Benedetti highlights (2011: 15), the operation of attentional discarding must not be confused with the operation of stopping to focus the attention on an object, because when we attentionally discard an object – but not when we stop focus our attention on it – we keep in mind that the object that has been discarded was previously focused on.

Not using or taking sth	Can you see without your glasses?	He needs glasses to see
Used with the -ing form to mean not	He left without saying goodbye	One usually says goodbye when leaving

Usually, the positive representation of the event is replaced by its negative counterpart for various reasons: one can have compared the positive representation with the actual event and judged that the former does not reflect the latter; or one can think about what will happen (e.g., "My husband is going to buy something") and imagine that the positive representation ("When he buys something, he always makes some mistake") is not desirable, thus concluding that it is better to change the course of events ("Don't go without me" OALD). What is important to note is that the positive representation is built on one's shared or personal knowledge, expectations, desires, what one thinks about how events usually evolve, what one conceives as normal, etc. Therefore, the use of the preposition *without* can often be indicative of one's beliefs, attitudes, motivations, etc.

It can then be concluded that the primary meaning of the preposition *without* invariably instructs one *to attentionally discard Z in order to replace the positive representation implied by the PA with its negative counterpart.*

One of the main implications of the use of *without* is that *without*, while directing one's attention to Z, whose presence represents the norm, tends to divert one's attention specifically from the possibility of conceiving as normal, acceptable, etc. the negative representation, rather than generally from anything else. For example, "I can't even make a fire without a lighter", while directing one's attention to the fact that fires are usually lit by means of a lighter, defocuses it specifically from the possibility of making a fire by not using a lighter, rather than from, for example, which kind of fuel one burns.

The secondary, less common and used meaning of *without*, which will not be analyzed here, is synonymous with "outside" and is often opposed to *within*: "The church stands without the city wall", "O'Connor's statement, in a nineteen thousand word, twelve-page article in the weekly archdiocesan newspaper, Catholic New York, caused an immediate furor within and without the Church" (COCA). In my view, this secondary meaning, although being much older than the primary one (it derives from the Old English *wiðutan* "outside of, from outside," literally "against the outside", opposite of *within*) and although sharing some commonalities with the primary one (as Lindstromberg [2010: 221] observes, there might be a clue of the connection between the old and the new meaning of *without* in the fact that English "has a few other expressions – e.g., "be/run out (of money)" – which liken not having something to being outside of it"), must not be confused with the primary meaning for two main reasons. Firstly, it conveys the idea of a bounded spatial, temporal or typological space, which the primary meaning does not convey at all. Indeed, as Lindstromberg (2010: 221) observes, when one considers *without* as opposed to *with*, one finds that while *with* can be used spatially ("Put the hammer with the other tools"), *without* cannot ("Put the hammer *without* the other tools" is not acceptable). Secondly, contrary to the primary meaning

of *without*, the secondary meaning does not seem to necessarily convey the idea of a positive presupposition that must be replaced by discarding Z.

4. CONCLUSION

In this chapter, I have presented my analyses of the English prepositions *of*, *in*, *to*, *for*, *with*, *on*, *at*, *by*, *over*, *against* and *without*, which are among the most frequently used words in English. The analyses show the specific instructions that each preposition provides on how Z determines X (for a summary, see Table 5.12).

Table 5.12. The instructions provided by the English prepositions of, in, to, for, with, on, at, by, over, against, and without

Preposition	Instructions provided by the preposition about how Z determines X
Of	Identify X on the basis of the domain provided by Z. Z can either be a domain of its own or a member of a domain.
In	Assign some part of the space delimited and occupied by Z to X.
To	Develop the construction of X by using Z as the end point of the construction developmental process of X.
For	Construct something (A) as a result that is obtained by means of something else (B). There are two possibilities: either (A)=X and (B)=Z or (ii) (A)=Z and (B)=X.
With	Associate the construction of X with the concurrent construction of Z, so that the construction of the former cannot occur if the construction of the latter does not occur.
On	Apply X to Z.
At	Assign the position that Z occupies in a certain domain to X.
By	Determine the characteristics of X on the basis of the reference provided by Z.
Over	Assign X with the capacity to mentally encompass part of the bounded domain represented by Z, its bounds included.
Against	Make X exert its action on Z.
Without	Attentionally discard Z in order to replace the positive representation implied by the PA with its negative counterpart (This is the primary meaning. The secondary meaning is akin to *outside* and was not analyzed).

The analyses are spelled out in terms of the CO that produce the conscious experiences conveyed by each preposition. This has allowed me to avoid falling into the trap of the traditional debate concerning the syncategorematic, polysemantic or monosemantic nature of prepositions. As I have tried to show, this debate is quite ill posed and originates from analyzing prepositions in terms of

the result they produce in combination with X and Z, that is, the overall meaning of the PA. By analyzing the meaning of prepositions in terms of the results they produce, one improperly introduces the products of the usage of prepositions into the analysis itself, and consequently fosters the undue proliferation of distinct senses, as well as of circular definitions, of prepositions. As a final remark, it is important to highlight that the analyses I have put forward here are not intended to be definitive or exhaustive for two main reasons. Firstly, because the set of CO I have adopted can always be modified and expanded according to newly-acquired knowledge on cognitive processes. Secondly, because the more prepositions are analysed, the higher is the possibility of adjusting and fine-tuning the analyses previously performed.

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