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ON THE SYNTAX AND SEMANTICS OF SPANISH SPATIAL PREPOSITIONS

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ABSTRACT. The goal of this paper is to offer a novel account on the Syntax and Semantics of Spanish Spatial Prepositions. This account is novel in at least three aspects. First, the account offers a unified syntactic analysis that covers understudied types of Spanish Spatial Prepositions (e.g. *en el centro de, junto y a la izquierda de*). Second, the account shows that such treatment can be extended to morphological phenomena, and can capture both their internal structure (e.g. *de-bajo*), and licensing patterns pertaining to argument demotion. The account also captures an alternation between “a-“ (e.g. *alante*) and “de-“ Prepositions (e.g. *debajo*), with respect to demotion, and is consistent with standard treatments of *where*-questions (*dónde*, in Spanish). Third, the account offers a “direct compositionality” semantic treatment, in which the interpretation of Spanish Spatial Prepositions is directly “read off” from their structure. This account is shown to capture all the semantic data discussed in the paper (argument demotion, interaction of Prepositions with Verbs, coordinated Prepositions), and to successfully extend previous accounts of this category.

Keywords. spatial prepositions, type-logical grammars, lexical syntax, distributed morphology, argument demotion, questions, direct compositionality

RESUMEN. El objetivo de este estudio es proponer una nueva aproximación de la sintaxis y la semántica de las preposiciones espaciales en español. Esta aproximación es novedosa en, al menos, tres aspectos. Primero, ofrece un análisis sintáctico unificado que incluye las preposiciones espaciales cuyo estudio no ha recibido suficiente atención en el pasado (p.e. *en el centro de, junto o a la izquierda de*). Segundo, el estudio demuestra que esta nueva aproximación puede extenderse al estudio de los fenómenos morfológicos, y que puede explicar tanto la estructura interna (p.e. *de-bajo*) como la validez de los patrones de omisión de los argumentos. Esta aproximación también clarifica la alternancia entre *a-* (*abajo*) y *de-* (*debajo*) con respecto a la omisión de los argumentos y es consistente con los tratamientos estándar de las ‘preguntas-*dónde*’. En tercer lugar, esta aproximación ofrece un tratamiento semántico de la ‘composicionalidad directa’, en el que la interpretación de estas preposiciones deriva directamente de su estructura. Esta aproximación explica todos los casos semánticos incluidos en este estudio (omisión del argumento, interacción preposición-verbo, preposiciones diyuntivas) y expande estudios anteriores acerca de esta categoría.

Palabras clave. preposiciones espaciales, gramáticas “type-logical”, sintaxis léxica; morfología distribuida, omisión del argumento, preguntas, composicionalidad directa

1. Introduction: The Problem of Spanish Spatial Prepositions¹

There is a relative dearth of literature on *Spanish Spatial Prepositions* (henceforth: SSPs). Descriptive and theoretical works suggest that this category can be partitioned

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into two classes, often known as “simple” and “complex” SSPs (Bosque 1997; Butt & Benjamin 2004: part 7; among others.). This distinction is based on morphological, syntactic and semantic properties of SSPs. Simple SSPs are mono-morphemic, and denote a “topological” spatial relation between *figure* (the located entity) and the landmark object or *ground* (Talmy 1978, 2000). Complex SSPs, instead, usually include two distinct morphemes, and denote a relation between figure and ground that captures the orientation/direction of this relation. Consider examples (1)-(2)²:

- (1) Mario está en la sala (en: Simple SSP)
Mario is-E in the room
 ‘Mario is in the room’
- (2) El libro está encima de la mesa (encima de: complex SSP)
The book is-E on top of the table
 ‘The book is on top of the table’

One problem with this descriptive classification is that it does not easily lend itself to the analysis of SSPs which display more complex morph-syntactic patterns. I offer some examples of these understudied SSPs in (3)-(6):

- (3) El coche está a través de la calle
The car is-E at cross of the street
 ‘The car is across the street’
- (4) Mario está a la izquierda de la bicicleta
Mario is-E at the left of the bicycle
 ‘Mario is to the left of the bicycle’
- (5) Mario va/esta de-trás de la bicicleta
Mario goes/is-E of-back of the bicycle
 ‘Mario goes/is behind the bicycle’
- (6) Mario va/está delante o detrás de la bicicleta
Mario goes/is-E in front or behind of the bicycle
 ‘Mario goes/is in front or behind the bicycle’

The structures that we can assign to this category, at least at a first glance, seem to be rather heterogeneous. At a descriptive, pre-theoretical level SSPs appear to involve several distinct syntactic positions, with a degree of “quantitative” variation amongst Lexical Items. For instance, the SSPs *a traves de* and *a la izquierda de* in (3)-(4) include three and four distinct morphemes: *a*, *traves* and *de*, and *a*, *la*, *izquierda* and *de*, respectively. The SSP *detrás de* in (5) seems to include two morphemes, *detrás* and *de*. However, according to some analyses (e.g. Bosque 1997: 141), the morpheme *detrás* can be further decomposed into the (bound) morphemes *de-* and *-trás*. Such SSPs seem to also include a level of morphological structure which is accessible to syntactic operations, a reason for which these syntactic analyses usually include a morphological component, in their theoretical range.

Aside these different types of “complex” SSPs, there are SSPs such as *a través o detrás de* in (6) that seem to involve an even more complex structure. This structure corresponds to the combination of two “simpler” SSPs, *a traves* and *detrás de*, via the

² SSPs that denote Static, or Locative meanings combine with the “static” copula *estar*. I temporarily use the labels “Static”, “Locative” in a pre-theoretical way, as I will discuss these notions in more detail in the remainder of the paper. When necessary, I also gloss the auxiliary verb *estar* as *to be*, plus a morpheme “-E”, to capture the slight difference in meaning with *ser*, ‘to be’ (Maierborn 2005).

contribution of disjunction *o* ‘or’. The resulting “Coordinated” Prepositional Phrase denotes two possible positions that Mario can be located at, with respect to the “common” ground denoted by *la bicicleta*. One is the front, and the other is the posterior region defined with respect to the bicycle. Similar patterns can also be found when coordination *e*, ‘and’, acts as a connective between SSPs. One way to look at these non-spatial prepositions is to consider them “syncategorematic” Heads, Heads that combine with other categories, which determine the resulting Phrase type. So, the Phrase *delante o detrás de* can be considered as a complex type of SSP, that I call *Boolean SSPs*, since can be generated via the Boolean operators *e* ‘and’, *o* ‘or’ (Emonds 1985; Zwarts & Winter 2000: 190-195).

We turn to another important aspect of SSPs and their properties shown in (5)-(6). Most, if not all SSPs can combine with both the copula *estar* ‘to be’ and the basic verb of motion *ir* ‘to go’. However, little has been said on the import of these data for a *semantic* analysis of this category. A classical assumption is that SPs can be partitioned into the two *directional* and *locative* classes. These classes are identified via the ability of an SP to combine with the copula or not. In English, SPs such as *to* and *through* cannot combine with *to be* (i.e. we have **is to room*, **is through the room*: Jackendoff 1983; Zwarts 2005; a.o.). However, several works have observed that SPs do not rigidly belong to one or the other class. In several contexts, SPs that usually have a locative interpretation, such as *at*, may also occur in “directional” environments (e.g. *arrive at*: Tungseth 2006, Ramchand & Tungseth 2006; Son 2007, Nikitina 2008). This pattern is not restricted to English SPs, but is found across several other Romance and German languages, including Spanish (Gehrke 2008; Matellán & Mateu 2010; Real Puigdollers 2010; a.o.). So, the data in (5)-(6) suggest that a semantically flexible approach to these classes, and their semantic relation, is likely to be an empirical necessity.

Overall, these preliminary data already sketch a set of problems in need of a solution. For instance, the data in (3)-(4) are seldom discussed in the literature, and treated as exceptions to the “two units” rule (Aske 1989; Bosque 1997: 138-140). Classical and recent works analyse in some detail data such as (5), but in part leave aside an in-depth analysis of their role in a broader theory of SSPs (Fabregás 2007; Real Puigdollers 2010; a.o.). The data that involve Boolean SSPs in (6) appear to be entirely novel. To our knowledge, no discussion exists on SSPs that can emerge as the complex result of coordinating/disjoining “simpler” SSPs, and on their status as fully legitimate members of this category. This dearth of empirical coverage spans over syntactic processes, too, and becomes particularly clear when these processes interface with other “modules” of Language, such as Discourse and Discourse-bound phenomena. I discuss two processes, out of several possible ones, which appear to offer a particularly clear insight on the syntactic properties of this category: *argument demotion*, and *where-questions*. I start from argument demotion, shown in (7)-(8):

- (7) *Luigi está fuera de la calma. Mario está en (la sala)
Luigi is-E. out of the room. Mario is-E in (the room)
 ‘Luigi is out of the room. Mario is in (the room)’
- (8) El balón está debajo de la mesa. El libro está encima (de la mesa)
The ball is-E. below of the table. The book is-E on top (of the table)
 ‘The ball is below the table. book is on top (of the table)’

Argument demotion is usually defined as a form of *ellipsis* that targets argument DPs already introduced in Discourse (den Dikken 2006: ch. 2; Svenonius 2010; a.o.).

As (7)-(8) show, argument demotion can occur when complex SSPs introduce the relevant argument, for the most part, and can target a “part” of the SSP Phrase, rather than just the argument DP (e.g. *de la mesa* in (8)). While the syntactic aspects of this phenomenon are descriptively clear, a precise account of its underlying principles is still missing, at least for those principles operating on SSPs and the argument DPs they introduce.

Let us turn our attention to *dónde*-questions. The syntactic properties of *where*-questions fall out from general theories of *wh*-questions, which we do not review here (but see Cheng 1997; Corver & Cheng 2007: ch.1; a.o.). For our purposes, one crucial aspect is the following: S(patial)PPs can be defined as those Phrases that can be offered as answers to *where*-questions (Jackendoff 1983; a.o.). For Spanish, this basic assumption entails that the answers in (9)-(13) may instantiate distinct descriptive types of SSP Phrases, but SSP Phrases nonetheless:

- (9) Q: ¿Dónde está Mario? A: En la sala
Where is-E Mario? In the room
 ‘Where is Mario? In the room’
- (10) Q: ¿Dónde está Mario? A: Delante de la silla
Where is-E Mario? Ahead of the chair
 ‘Where is Mario? Ahead of the chair’
- (11) Q: ¿Dónde está Mario? A: A través de la calle
Where is-E Mario? At cross of the street
 ‘Where is Mario? Across the street’
- (12) Q: ¿Dónde está Mario? A: Por entre las sillas
Where is-E Mario? Through between the chairs
 ‘Where is Mario? Among the chairs’
- (13) Q: ¿Dónde está Mario? A: Junto y delante del coche
Where is-E Mario? Next and in front of+the car
 ‘Where is Mario? Next and in front of the car’

Examples (9)-(13) show that the Phrases *en la sala*, *delante de la silla*, *a traves de la silla*, *por entre las sillas* and *junto y delante del coche* can all be legitimate answers to a *Dónde*-question. Hence, they should all be treated as SSP Phrases, whether they involve “simple” or “complex” structures. This argument holds for Boolean SSP Phrases such as *junto y delante del coche* ‘next and in front of the car’, which can also act as answers, as the other SSPs. Although these data offer a clear picture of the variety of possible SSP Phrases that can be answers to *dónde*-questions, a general theory of their structure appears still out of our reach. If all of these SSP Phrases can be answers, then they should belong to just one abstract syntactic category. However, given the current theorising about SSPs, it is not clear whether we can offer a unified account of SSP types that can also account the *dónde*-questions data.

Overall, the data in (1)-(13) strongly suggest that a unifying syntactic theory of SSPs is called for. Once we consider the fact that these proposals do not touch the general *semantic* properties of SSPs, the lack of a thorough analysis of this category seems particularly stringent. Several proposals on the semantics of English SPs exist, some of them being for the most part *compositional* in nature (Zwarts & Winter 2000; Kracht 2002; a.o.). However, it is an open question on whether these proposals can be directly extended to the Spanish data in (1)-(13), since we lack a clear syntactic analysis of SSPs. Without a clear account of the syntactic structures that underpin this category, a compositional account for their semantic contribution is an insurmountable

challenge. Once we factor in the empirical problems that pertain to the interaction of Verbs with SSPs, argument demotion and *dónde*-questions, then the lack of an accurate syntax and semantics of SSPs becomes quite manifest. Therefore, at least three open questions arise, with respect to this category.

A first question is whether we can offer one morpho-syntactic account that can correctly explain and predict the syntactic structure of *all* SSPs. Such an account must also be derivationally consistent, i.e. explain and *predict* the argument demotion and *dónde*-question data, as syntactic processes that are structure-sensitive.

A second question is whether we can offer a compositional analysis of SSPs that can be directly implemented into our syntactic account. If this proposal is possible, then it must account the interpretation of our examples. In turn, it must also be accurate enough to handle the distributional data discussed in (5)-(6), but also the semantic import of argument demotion and *dónde*-questions.

A third question, less stringent but nevertheless important, is whether our new proposal can successfully build over previous proposals, and offer a more thorough theory of SSPs. Therefore, a question that we face is whether we can successfully treat novel data that could be problematic for previous proposals, while at the same time preserve the good insights that previous proposals offer on this category.

The goal of this paper is to offer an account of SSPs that attempts to answer these questions. I aim to reach this goal in two steps. First, I aim to offer a morpho-syntactic account of SSPs that syntactic data in (1)-(13) under one unified theoretical framework. Second, I aim to offer a semantic account of SSPs that directly stems from the Syntax, and is *compositional* in nature. I will suggest that the interpretation of SSPs such as *a través de* directly follows from its syntactic structure, provided that we offer a correct syntactic analysis of this category. If we are successful, then we will offer a novel account of SSPs and their properties, which fills a theoretical and empirical void on this quite neglected category.

This paper is structured as follows. In section 2, I outline the key data about SSPs in more thorough detail, and discuss what explanatory problems are found in previous proposals. In this way, I introduce several types of novel data to the table of our discussion, and motivate our approach on the basis of these data. In section 3, I outline our morpho-syntactic proposal, its semantic counterpart, and offer our analysis of the data. I show that our approach, a simplified fragment of a Type-Logical (categorical) grammar with a simple situation semantics (isomorphic) interpretation, can account and predict the data I discuss. In plain words, I show that if we offer a unified morpho-syntactic analysis of SSPs such as *a través de* and their structure, then their derivational (e.g. argument demotion) and semantic properties are a consequence of this analysis. I conclude the section with a comparison between our proposals and previous literature. In section 4, I conclude the paper.

2. The Data: Old and New Data, and Previous Proposals

In this section I present the core data about SSPs. I first present basic descriptive data on this category, and introduce key notions in more detail (section 2.1). I introduce those sets of data that go beyond well-known patterns, and are still in need of an analysis (section 2.2). I then discuss theoretical proposals on Spanish and other SPs, assess their apparent short-comings in their analysis, and suggest what the empirical *desiderata* are (section 2.3).

2.1. Varieties of SSPs: “Old” Data

The goal of this section is to bring together and discuss several well-known data about SSPs, and outline which problems already emerge from these data.

As I mentioned in the introduction, standard analyses of SSPs contend that they can be distinguished between simple and complex SSPs (e.g. Butt & Benjamin 2004: part 7). I discuss the basic properties of these classes in this order. At the same time, I also discuss the interaction between SSPs and different types of Verbs, which is usually discussed in the literature on the Satellite/Verb-frame distinction (Talmy 2000; Matellán & Mateu 2010; Real Puigdollers 2010; a.o.). Our goal for this layer of analysis, foreshadowed in examples (5)-(6), is to prepare our discussion for the semantic analysis of SSPs, offered in section 3.4.2.

Simple SSPs are mono-morphemic, as their name indirectly suggests. They usually denote spatial relations that amount to a topological relation between figure and ground, and which can be changing or stable over time. Some examples include *a*, *desde*, *hacia*, *en*, *por*, *entre*, *sobre*, *bajo* which are translated as ‘to’, ‘from’, ‘to’ or ‘towards’, ‘in’, ‘through’ or ‘via’, ‘between’, ‘on/above’, ‘under/below’, respectively. Some examples of sentences including simple SSPs are presented in (14)-(16):

- (14) Mario *va/está* a la mesa
Mario goes/is-E at the table
 ‘Mario goes/is to/at the table’
- (15) Mario *va/se sienta* mirando *hacia* el coche
Mario goes/himself sits looking towards the city
 ‘Mario goes/himself sits looking towards the city’
- (16) Mario *va/se* sienta *entre* las sillas
Mario goes/himself sits between the chairs
 ‘Mario goes/sits between the chairs’

These examples also display the basic syntactic contexts in which these SSPs can occur. Simple SSPs may combine with both “static” and “dynamic” Verbs. I define these Verbs as respectively denoting the static position of a figure, and the dynamic event of motion the figure is involved in. For instance, *se sienta* denotes the figure’s unchanging position, *va* the event of motion that the figure is involved in. I use these theory-neutral labels, to avoid terminological confusion. As the examples suggest, the semantic contribution of an SSP seems to depend on whether it combines with a Verb. For instance, *en* in (14) can be translated as either *into* or *in*, depending on whether it combines with *va* ‘goes’ or *está* ‘is’. If a Verb belongs to the “static” category, as intuitively *se sienta* does, then an SSP denotes the location where the figure is located. If a Verb belongs to the “dynamic” category, as intuitively *va* does, then the SSP denotes the location where the figure is directed to, or may pass through during an event of motion.

Therefore, and as observed in the literature, the semantic contribution of SSPs seems not to include an event-based component, i.e. whether the figure is involved in an event of motion or not. This observation is in line with the general observation that Spanish is, for the most part, a Verb-framed Language (Matellán & Mateu 2010). However, it also suggests that SSPs require a more flexible approach to the relation between the locative and directional classes, as argued in the literature (Gehrke 2008; Real Puigdollers 2010; a.o.). I also defer discussion of these topics to section 3.4.2, once we will have a full semantic analysis of SSPs.

Complex SSPs seem to share similar properties. These SSPs include two distinct units which tend to denote more specific spatial relations: hence, the use of the “complex” label. They tend to involve the combination of a general relational Head, *de* but also *a*, with a more specific unit that denotes a specific orientation, or direction, of the (moving) figure with respect to the ground. Examples include *debajo de*, *detrás de*, *dentro de*, *cerca de*, *alrededor de*, *delante de*, *delante de*, *encima de*, *fuera de*, *junto a*, *frente a*. Their respective translations into English are ‘below’, ‘behind’, ‘inside’, ‘near’, ‘around’, ‘beside’, ‘ahead of’, ‘above’, ‘outside’, ‘next to’, ‘against’. A partial analysis of these SSPs is offered in Fábregas (2007), which however focuses on a set of data that I will discuss in section 2.2. Some examples are in (17)-(21):

- (17) Mario salta/está encima/debajo de la mesa
Mario jumps/is-E on-top/below of the table
 ‘Mario jumps/is on top/below the table’
- (18) Mario va/está detrás/delante de la casa
Mario goes/is-E behind/ahead of the house
 ‘Mario goes/is behind/in front of the house’
- (19) Mario va/está alrededor/cerca de la casa
Mario goes/is-E around/near of the house
 ‘Mario is around/near the house’
- (20) Mario va/está dentro/fuera de la casa
Mario goes/is-E inside/out of the house
 ‘Mario is inside/outside the house’
- (21) Mario va/está junto/frente a la casa
Mario goes/is-E next/front at the house
 ‘Mario goes/is-E next to/in front of the house’

These examples suggest that the structure of these SSPs is remarkably regular, as it follows the template “P+*de*” or “P+*a*” in a rigorous way³. Examples (17)-(21) also suggest that complex SSPs can freely combine with both static (*estar* ‘to be’) and dynamic Verb types (*saltar* ‘to jump’, *ir* ‘to go’). As in the case of simple SSPs, their interpretation seems to depend on the Verb’s interpretation. With static Verbs, these SSPs denote the location of the verb’s “state” or activity: where Mario is sitting, for instance. With dynamic Verbs, they can denote a transitory position that a moving figure can occupy during an event of motion. So, complex SSPs also appear to “only” denote a spatial component of meaning, leaving event-bound aspects to the Verbs they combine with. Aside this regular type of complex SSPs, other complex types exist, that include the combination or “juxtaposition” of SSPs, as discussed in Bosque (1997). These Items can (or must) combine only with a dynamic Verb, as sometimes discussed in the literature (Butt & Benjamin 2004: part 7; a.o.). Consider examples (22)-(23):

- (22) Mario pasea por entre las sillas
Mario walks through between the chairs
 ‘Mario walks among the chairs’

³ While this seems to be true in standard European varieties of Spanish, I am aware that other varieties may involve occurrences of SSPs without *de* (Fábregas 2007). I think that the analysis I propose in this paper lends itself to those data as well, *modulo* some dialect-specific assumptions. However, I will leave aside these dialectal variations, and only focus on European Spanish data, in the rest of the paper.

- (23) Mario salta de debajo de la mesa
Mario jumps of below of the table
 ‘Mario jumps from below the table’

Simple SSPs such as *por* ‘through’ can combine with other simple SSPs such as *entre* ‘between’; or *de*, translated in its first instance as ‘from’, can combine with *debajo de* ‘below’. The resulting complex SSP denotes the starting or temporary position of the figure, which is understood as being in motion. As other complex SSPs, these examples involve two distinct P units, which in this case also happen to be part of the set of simple SSPs. So, Complex SSPs can involve either the combination of a morpheme denoting a certain location or “region” and *de* or *a*; or the juxtaposition of two simple SSPs, such as *por* and *entre*. Some semantic limitations emerge from the interplay between these juxtaposed SSPs, but fall entirely within the general Verb-framed distribution of SSPs.

Overall, these data suggest that the partition between simple and complex SSPs seems to be descriptively adequate. Simple SSPs denote “topological” relations, which can combine with static and dynamic Verbs alike. Complex SSPs denote more specific relations, which usually involve an axial/directional component of meaning. They mostly involve a relational Head (*de* ‘of’ or *at*, here also *of*) and another element, which spells out a precise position (e.g. *fuera* ‘out’). Other combinations are possible, such as *de encima de*, but nevertheless fall within the “two Ps” schema. Although adequate, these classes do not exhaustively describe the full range of possible SSPs and their structures. For this reason, I discuss novel data.

2.2. Varieties of SSPs: Novel and Unexplained Data

The goal of this section is to discuss several data about SSPs that have seldom been discussed into any relevant detail, and explain what theoretical challenges these data present. Some more known data, and their relation to the novel data at stake, are also discussed in detail.

As Bosque (1997: 133) observes, standard descriptive accounts of SSPs tend to leave aside SSPs which display more complex structures than the ones just discussed. When SSPs such as those listed in (3)-(6) are discussed, they are considered as “serialisations” of complex SSPs, rather than distinct syntactic units. So, their syntactic properties tend to be understudied, if not excluded from analysis altogether. Examples of poorly covered SSPs include *en frente de*, *en contra de*, *a través de*, *a la izquierda de*, *a la derecha de*, *al lado de*, *en el centro de*, *en el principio de*, *en el extremo de*. Their translations are ‘in front of’, ‘against’, ‘across’, ‘to the left of’, ‘to the right of’, ‘next to’, ‘at the centre of’, ‘at the beginning of’, ‘at the end of’, respectively. Note that, although modern standard Spanish usually includes *en* and *frente* in their conflated form i.e. (*enfrente*), the non-conflated form is still attested; in a number of syntactic contexts, it is still the norm (see Fábregas 2007: 10-14 for discussion). For this reason, I take a conservative stance, and analyse this SSP as including (at least) two distinct morphemes⁴ Longer lists can be defined, but the basic intuition should be clear. SSPs may involve more than two distinct (morpho-)syntactic units, even units that are not “Ps”, such as Determiners. I illustrate these cases with (24)-(27):

⁴ I thank an anonymous reviewer for raising this issue, which escaped my attention in an earlier draft of this paper.

- (24) Mario va/está a la izquierda/derecha de la casa
Mario goes/is-S at the left/right of the house
 ‘Mario goes/is to the left/right of the house’
- (25) Mario va/está en el centro/extremo de la calle
Mario va/is-E in the centre/end of the road
 ‘Mario goes/is at the centre/end of the road’
- (26) Mario va/está al lado de la casa
Mario goes/is-E at+the side of the house
 ‘Mario goes/is next to the house’
- (27) Mario va/está en el principio de la calle
Mario goes/is-E in the beginning of the street
 ‘Mario goes/is at the beginning of the street’

These examples show that these act as spatial Prepositions, much like their “simpler” counterparts. Examples (24)-(27) also suggest that these SSPs depend on the Verb, on whether they are interpreted as denoting a location or end-point of some event of motion. As these examples show, the minimal differences between these and other complex SSPs is the presence of the definite article *el* or *la*, respectively the masculine and feminine singular counterparts of ‘the’. A further possibility is that distinct SSPs can be explicitly combined via the mediating action of Boolean Ps, such as disjunction *o* ‘or’ or coordination *e* ‘and’. I illustrate this via examples (28)-(29):

- (28) Mario va/está encima o delante de la mesa
Mario goes/is-E on-top or ahead of the table
 ‘Mario goes/is on top or in front of the table’
- (29) Mario va/está encima y delante de la mesa
Mario is-E/goes on-top and ahead of the table
 ‘Mario is/goes on top or in front of the table’

In (28)-(29), disjunction and coordination respectively allow the combination of *encima* ‘on top’ and *delante* ‘ahead’ into a more complex SSP Phrase, *encima o delante*. These complex SSPs seem to form a single syntactic unit, via the intervention of the Boolean connectives, hence they should be seen as full-fledged (and complex) SSPs. Three types of data support this view. First, the syncagorematic Phrase that obtains when two SSPs are combined together combines, in turn, with *de* (i.e. *encima o delante de*). Second, the SSP containing this unit can undergo argument demotion, but only if the “Boolean” unit is preserved (i.e. *encima o delante (de la mesa)*). A third form of evidence for this structural unity is semantic. When combined, the two Ps *encima* ‘on top’ and *delante* ‘in front’ denote two possible locations defined with respect to the ground, *la mesa* ‘the table’. The examples in (28)-(29) also show that Boolean Ps seem to freely combine with both static and dynamic Verbs, as they combine with both *está* and *va*. Therefore, Boolean SSPs appear to fully deserve their status as SSPs, an argument I pursue again in a few paragraphs⁵, when I discuss *dónde*-questions in thorough detail.

Overall, these data strongly suggest that descriptive classifications appear limited in their empirical range, to a good extent. Hence, different types of complex SSPs, such

⁵ I note that Boolean SSPs can undergo iteration: we can have *en frente o junto y a la izquierda de la sala*, for instance. So, if these SSPs are part of this category, then the category shows a degree of “open-endedness”. I leave this issue and its thorny ramifications aside, in this paper.

as *a través de* or *en el centro de*, or even *encima o delante de*, cannot be easily described, let alone explained, within a purely descriptive framework. So, these data are still in need of an explanation that is consistent with an explanation about the “old” data we discussed in section 2.1. This lack of empirical coverage, however, is not limited to more syntactically complex SSPs. It also involves morphologically complex items that belong to the category. Works that focus on the morphological properties of this category observe that several SSPs seem to involve the “conflation”⁶ of two morphemes into a single word/unit. For instance, Bosque (1997: 136-140) observes that several SSPs beginning with *de-* can be traced to the conflation of the morpheme *de-* with a nominal-like element. This element, in turn, usually denotes a possible “position” or “part” of the ground, in which the figure is located. According to this analysis, at least the following SSPs can be segmented in two morphemes:

(30) *de-bajo, de-trás, d-entro, de-lante, en-cima*;

The “nominal” morphemes are *-bajo, -trás, -entro, -lante* or *-ante, -cima*. These morphemes can be etymologically traced to nouns denoting body parts, respectively ‘bottom’ ‘back’, ‘interior’, ‘front’, ‘top’. Apparently, *alrededor* may be analysed in a similar way, although it is not clear what the constituent morphemes, and their intended interpretation, should be (Fábregas 2007). The important insight behind these facts is that these morphemes combine with *de-*, which seems to act as a prefix-like element. This analysis is perhaps not perfect, viz. the segmentation of *dentro*. However, this analysis captures the intuition that SSPs have their own morphological structure (c.f. Pavón 1999; a.o.). Similar proposals can be found for other languages, on parallel sets of morpho-syntactic data (Kracht 2002, 2004; Svenonius 2006: 79-84; Pantcheva 2006; Asbury 2008: ch.3; a.o.). Therefore, the SSP datum can be seen as part of a general cross-linguistic pattern of morphological complexity, at least for this specific category.

Further evidence that an integrated morphological and syntactic analysis is needed comes from the analysis of “axial” terms in Spanish, offered in Fábregas (2007). This work analyses “Axpert” terms, terms that denote which axis of the ground is involved in a spatial relation (e.g. *frente*). The work also discusses a series of closely related Axpert terms that cannot occur with ground DPs⁷, lest the sentence be ungrammatical. I offer some examples in (31)-(33):

- (31) *El libro está a-lante de la mesa
The book is-E at-front of the table
 ‘The book is in front of the table’
- (32) *El libro está a-trás de la mesa
The book is-E at-front of the table
 ‘The book is in front of the table’
- (33) Mario está/va a-bajo
Mario is-E/goes at-bottom
 ‘Mario goes down’

⁶ Conflation is descriptively defined as the property of two consecutive units to form a single morphological unit (Talmy 1983, 2000). I will offer a more precise definition in section 3.

⁷ Note that Fábregas (2007: 28-31) discusses a family of Spanish dialects, distinct from “standard” Spanish, in which these Ps can combine with *de*, and take a Ground DP. I do not discuss this family of dialects here.

Examples (31)-(33) show that those Axial terms that involve the “prefix” *a-* cannot occur as part of a complex SSP, so they cannot combine with a ground DP. If they do, then the sentence is ungrammatical. Example (33) shows the standard distribution of these terms, as particle-like elements that can combine with different types of verbs. Intuitively, (33) denotes a scenario in which Mario goes, or is located at, the bottom region of some implicit ground, which must be left phonologically unrealised. A list of these SSPs is shown in (34), and includes the following lexical items (Fábregas, 2007: ex. (1) and (3)):

- (34) *a-lante, a-trás, a-bajo, a-rriba, a-fuera, a-dentro,*

These SSPs are glossed as ‘at-front’, ‘at-back’, ‘at-bottom’, and so on. Since these (Axial) terms cannot combine with ground DPs, the minimal difference between the *de-* series and the *a-* series is “selectional”, in nature. While *a-* signals that the ground is an implicit argument, *de-* marks its overt presence. So, the “decomposition” of these Ps into smaller units is justified by these distributional patterns, as they show that, to an extent, conflated morphemes act as syntactic, distinct units in syntactic processes. Therefore, the morphological structure of SSPs seems to correspond to a precise set of data in need of an explanation, which we must then address.

If this decomposition is correct, however, then the structure of most complex SSPs seems to be even more elaborate than we initially discussed. The pre-theoretical intuition is as follows. Under this analysis, complex SSPs involve at least three morpho-syntactic “positions”, which are furthermore semantically related. Hence, *delante de* consists of two morphemes *delante* and *de*, with *delante* further decomposable into the (bound) morphemes *de-* and *-lante*. These morphemes may project distinct morpho-syntactic positions, and may involve different “degrees” of Conflation. However, their interaction also seems to suggest that, at some level of representation, they are all distinct units making up the SSP *delante de*. Crucially, the *a-* series displays properties of syntactic Heads, such as controlling/selecting the realisation of its DP. Therefore, each morpheme seem to qualitatively act as a distinct syntactic “position”, once we look at the syntactic processes we have discussed so far.

We now have quite strong evidence that the morpho-syntactic structure of SSPs seems to require a quite more articulated analysis than the ones offered in previous works. However, an even more complex and subtler picture emerges once we discuss a wider range of (discourse-bound) argument demotion data than the ones in the introduction. Consider examples (35)-(38), that present argument demotion cases:

- (35) Luigi está fuera de la sala. Mario está en frente (de la sala)
Luigi is-E. out of the room. Mario is-E in front (of the room)
 ‘Luigi is out of the room. Mario is in front (the room)’
- (36) El balón está debajo de la mesa. El libro está a la izquierda (de la mesa)
The ball is-E. below of the table. The book is-E at the left (of the table)
 ‘The ball is below the table. book is on the left (of the table)’
- (37) El balón está debajo de la mesa. *El libro está a la izquierda o (delante de la mesa)
The ball is-E. below of the table. The book is-E at the left or (in front of the table)
 The ball is below the table. The book is on the left or (in front of the table)’
- (38) El balón está debajo de la mesa. El libro está alante (*de la mesa)
*The ball is-E. below of the table. The book is-E ahead (*of the table)*

‘The ball is below the table. book is in front (*of the table)’

Examples (35)-(38) show that argument demotion, when applied to the novel SSPs we have discussed in the previous section, targets the relational P unit that introduces the ground DP, i.e. *de*. Argument demotion cannot target “larger” units, as the Boolean SSP *a la izquierda o delante de* cannot involve “partial” demotions, e.g. (37). Note that, in (35), the “surviving” SSP can also be written as *enfrente*, as I mentioned before. When particle-like SSPs are involved, such as *alante*, argument demotion is obligatory, since the ground DP must be omitted⁸. These cases, together with the ones in (7)-(8), seem to suggest that argument demotion, as a *syntactic* operation, targets one of the two units that make up an SSP, the relational P *de*. The other morpho-syntactic units that combine with *de* seem to form a single macro-unit (intuitively: a Phrase), with respect to this operation. Recall, furthermore, that since “simple” SSPs cannot undergo demotion (e.g. **en (la sala)* is ungrammatical, cf. (7)), this operation seems to be optional *only* with the sub-type of *de* SSPs, not others.

If argument demotion offers a case for treating SPs as composed at least of two morpho-syntactic units, then the *dónde*-questions data seem to support a similarly fine-grained and unitary view. They do so, however, in a subtly different way, a way that also fully qualifies Boolean SSPs as members of this category. Although seldom discussed in the literature, these data suggest that any of the types of SSPs discussed so far can be answer Phrases to these questions. I show some key examples, which are based on (9)-(13), in (39)-(42):

- (39) Q: ¿Dónde va/está Mario? A: en la sala/por entre las sillas
Where goes/is-E Mario? In the room/through between the chairs
 ‘Where goes/is Mario? In the room/In between the chairs’
- (40) Q: ¿Dónde va/está Mario? A: Delante de la silla/en frente de la silla
Where goes/is-E Mario? Ahead of the chair/In front of the chair
 ‘Where goes/is Mario? Ahead of the chair/In front of the chair’
- (41) Q: ¿Dónde va/está Mario? A: Junto y de-lante de la silla
Where goes/is-E Mario? Next and of-front of the chair
 ‘Where goes/is Mario? Next and in front of the chair’
- (42) Q: ¿Dónde va/está Mario? A: delante (de la silla)/alante (*de la silla)/*a (la silla)
*Where goes/is-E Mario? of-front (of the chair)/In front (*of the chair)/*at (the chair)*
 ‘Where goes/is Mario? In front (of the chair)’

So, if we take answer Phrases to *dónde*-questions as being SSP Phrases (as we should), then all of our discussed types of SSPs correspond to specific types of this Phrase. The “complexity” of each SSP that we take in consideration is not relevant, as the possible answer SSP Phrases show. Both *en la sala* ‘in the room’ and *junto y delante de la silla* ‘next and in front of the chair’ are possible answers to a *dónde*-question. Interestingly, example (42) shows that “demoted” answers are also possible, especially if offered within a broader discourse context (e.g. when a *dónde*-question is repeated). One can indeed answer *delante* or *alante* ‘in front’, to a *dónde*-question; if we consider the “internal” SP as a distinct Phrase, then this fact is straightforwardly

⁸ Note that, as also Fábregas (2007) observes, *alante* is still a fairly colloquial term, unlike its more standardised counterpart *adelante*. Normative distinctions aside, our analysis of *alante* is consistent with its colloquial uses.

accounted. The same facts discussed in (35)-(38) about argument demotion hold for question contexts as well. A partial answer such as **de la casa* or *frente de la casa* would be ungrammatical, since it would involve a “partial” SSP structure, and not a full Phrase. Note that *dónde*-questions can also be questions about “locations” and “destinations”, as the examples suggest. Both a dynamic Verb such as *ir* and a static one such as *estar* can occur in these questions. The *dónde*-question data also suggest that a flexible approach to the distinction between the directional and locative classes seems appropriate, since SSPs that belong to both categories can be answers.

So, SSPs seem indeed to involve two distinct units, as suggested in previous works, but with a distinct syntactic status than the one proposed in these works, as the data suggest. Pre-theoretically, one distinct unit seems to involve varying degrees of complexity, yet at the same time it seems to act as syntactic argument (Phrase) to a central, relational unit. Examples of the first unit include *delante*, *a través de*, *a la izquierda* and *a la izquierda o delante*, while the key instance of the second relational unit is *de*, for most SSPs discussed so far. Together, these units form the complex lexical items I have labelled as complex SSPs, old and novel alike. Since previous approaches consider both units as Heads (Bosque 1997; Fábregas 2007; a.o.), they seem to miss this important generalisation with respect to SSPs, in their analysis.

We thus have the following conundrum. Descriptive approaches do not analyse the structure of several SSPs, hence they cannot account the fact that complex SSPs can involve several morphemes in their structure. If SSPs involve “only” two units, then several SSPs seem to counter this prediction, both above and below the word level. However, when we look at syntactic processes, descriptive approaches seem at least to provide an intuition about the units involved in these processes. For instance, argument demotion seems to discriminate between two units, and systematically target the “lower” one for demotion. Complex SSPs seem to involve two units, although the precise status of these two units appears far from clear. So, SSPs seem to support descriptive approaches on some aspects, and reject them on some others. An open question, then, is whether current theoretical approaches overcome this impasse or not, a topic I discuss in the next section.

2.3. Previous Proposals, and Desiderata for a Theory of SSPs

There is a rich literature on the Syntax of SPs across languages, as recent collections testify (Asbury et al. 2008; Cinque & Rizzi 2010; a.o.). However, there are few works that attempt to analyse the morpho-syntactic properties of SSPs in some detail. One important work which I only have mentioned passing, so far, is Bosque (1997), perhaps the first generative analysis of SSPs. The analysis in this work, known as the *preposición tras preposición* (‘preposition after preposition’, or PtP) hypothesis, is based on two key assumptions⁹.

The first assumption is that not all multi-morphemic Spanish Ps represent genuine complex constituents. Only Spatial Ps (our SSPs) can form such structures, as they can involve at least two morphemes that jointly denote a spatial relation. We have discussed several examples cited in support of this assumption, such as *por entre* and similar other “juxtaposed” complex SSPs. According to Bosque (1997), then, this evidence suggests that a complex structure for Spatial Ps should be called for.

The second assumption is that SSPs may involve two distinct types of syntactic structure. These structures, in turn, are moulded after Jackendoff’s classic “Conceptual

⁹ A non-generative work that presents a similar analysis to that found in Bosque (1997) is Aske (1989). I focus on Bosque (1997), as Aske (1989) does not spell out a fully explicit formal analysis of SSPs and their internal structure.

Semantics” framework (Jackendoff 1983, 1990; a.o.). According to Bosque (1997), simple SSPs involve the combination of a “situation” type of Preposition that combines with an “Object” type of DP. Complex SSPs include a further conceptual layer, which can denote the concepts “Origin”, “Trajectory” or “Goal”, depending on the precise content of the second SSP. In the second structure, the order of single P units is rigid: the “Origin” P must always precede the “Situation” P. I illustrate these two types of SSPs and their respective structures in (34)¹⁰:

- (43) a.[SITUATION PREP [OBJECT NOUN]]
 b.[SITUATION *en* [OBJECT *la sala*]]
 c.[ORIGIN PREP [SITUATION PREP [OBJECT NOUN]]]
 d.[ORIGIN *desde* [SITUATION *sobre* [OBJECT *la mesa*]]]

While the type in (43a) represents the structure assigned to (43b) (*en la sala*), the type in (43c) represents the structure assigned to (43d) (*de sobre la mesa*). However, Bosque indirectly suggests that more complex SSPs can be assigned this latter structure as well, such as *desde sobre la mesa*, with *sobre* corresponding to the “Situation” Preposition. Since we do not have SSPs such as **en a la mesa*, i.e. sequences of “Situation” and “Goal” Ps, (43c) seems to accurately describe this structural relation. Although intuitively appealing, the proposal seems to face three problems, which emerge once one looks at our broader set of data.

A first problem is that, while SSPs (our label, not Bosque’s) such as *detrás* are analysed as the conflation of an “Origin” and a “Situation” Preposition (i.e. *de-* and *-trás* are conflated), SSPs such as *de-bajo*, instead, are treated as a “simple” SSPs. A second position is projected only if this SSP combines with a simple SSP such as *por*, without the postulation of an empty head in the structure (e.g. Bosque 1997: ex. (32)). As a consequence, the structure of SSPs seems to vary considerably, to the effect that one may not find an easy extension of the model that can account our novel data, such as *a través de* or *junto y delante de*.

A second problem is that, when we consider SSPs such as *en frente de*, *junto a* or *abajo*, the argument for a rigid order of positions seems to be on the wrong track. Since *a*, *en* or *de* seem to occur both at a higher and a lower position than the “Axial” P, a strict ordering seems to be not empirically accurate. An open question related to this problem, then, is whether the PtP model can be extended to account the argument demotion and *dónde*-question data. It appears that one may not find an easy extension of this model that can offer an accurate account of demotion and questions data.

A third problem is not specific to the PtP model, but emerges if one adopts a Conceptual Semantics approach to the semantics of SSPs, as in the PtP case. According to Jackendoff’s approach, SPs can (and should) be semantically partitioned into the mutually exclusive locative and directional SPs. So, locative Ps should only combine with Static Verbs, while directional Ps only combine with Dynamic Verbs. If this is the case, then the distributional flexibility of SSPs appears mysterious, as it runs counter to the data about Verbs and SSPs we have amply discussed so far. We also need to keep in mind that argument demotion, *dónde*-questions and the basic compositional interpretation of SSPs are actually out the theoretical reach of these theories. Therefore the semantic problems of SSPs appear clear enough, and tightly connected to their syntactic problems.

¹⁰ The classical Jackendovian scheme is: [PATH [PLACE PREP [THING NOUN]]] (Jackendoff, 1983, 1990). The PATH category generalises the three categories used by Bosque (1997). These differences are not crucial, here.

Overall, the PtP hypothesis seems to offer a very good understanding of SSPs and their structure and a good platform on which to build a more thorough theory of SSPs. This extension, however, can only be defined if we offer a proposal that can solve the three syntactic problems we discussed so far. If this solution is successful, then we assume that we can also offer a solution to the fourth, distinct semantic problem, too. Before offering such a solution, though, we discuss whether other alternative proposals are viable, and can offer us a simple solution to our problems. One theoretical alternative is to attempt to extend more recent theoretical proposals. Several recent proposals offer subtle syntactic analyses of SSPs that aim to offer such an extension (Fábregas 2007; Real Puigdollers 2010; Brucart 2012). For the sake of simplicity, I follow Fábregas (2007) and assume a fine-grained structure for SSPs, as per cartographic approach assumptions (Cinque 1999; Asbury 2008; Cinque & Rizzi 2010; a.o.). While Fábregas (2007) only focuses on A_{xpart} terms, he suggests this structure for the SSPs he discusses in detail:

(44) [Place en [A_{xpart} frente [_δ H [_γ H [Kase de [DP la mesa]]]]]]

[Fábregas 2007: ex. (13)]

The structure in (44) says that an SSP such as *en frente de* involves at several distinct “positions”, called Place, A_{xpart} and Kase (respectively: *en*, *frente* and *de*). The positions labelled as “ δ ” and “ γ ” represent functional positions which may roughly be associated to a part-whole relation defined between “Axis” and ground and a certain type functional marker, respectively. A possibility left open is that SSPs may include a further position, that of Dir(ectional)Ps, which may conflate with Verbs. Each distinct morphological unit projects its own “position” in the clausal spine. So, an SSP turns out to correspond to several “connected” morpho-syntactic positions, which form a so-called “P field”, in a structure equivalent to an “iterated” PtP model.

Although appealing, such a proposal would face most, if not all the problems into which the PtP hypothesis incurs. Since cartographic approaches assume, for the most part, a rigid sequence of functional heads (the *Functional SEquence* or FSEQ hypothesis), two problems seem to arise. First, data such as *a la izquierda de* are problematic. The definite article *the* does not easily fit into this structure, since its (rigid) position is not within the “P field”. Second, Boolean structures such as Boolean SSPs potentially create “copies” of the same positions in a structure (e.g. A_{xpart} *frente* after A_{xpart} *debajo*). These SSPs appear problematic for the FSEQ, as they create a linearisation paradox: one category must precede itself, as in the A_{xpart} case. I note that, for SSPs such as *a la izquierda de*, an alternative analysis to the structure in (44) can be offered. If one considers *la izquierda* as a DP, then only a PlaceP occurs, as the projected Head of *a* (see Svenonius 2006 for discussion). Here I attempt to show that a unified, FSEQ-based picture of SSPs would incur in linearisation problems, unlike proposals that take a more flexible stance to the structure of SSPs. So, although rather indirectly, I will offer an analysis that is closer to this two-pronged approach to the structure of SSPs¹¹.

Second, Argument demotion facts may also become problematic to account, since within a cartographic approach one would not easily block ungrammatical forms of demotion, perhaps without *ad hoc* assumptions. One would require rather specific assumptions to rule out (37), which includes the ungrammatical string **a la izquierda*

¹¹ I thank an anonymous reviewer for pointing my attention to this topic.

o (delante de la mesa). Similar problems would emerge for *dónde*-questions data, at least if one postulates a version of Cartography in which any SP in the “P field” could form a *dónde*-answer¹². An obvious assumption could be that *dónde*-questions target the top-most category of an SSP, e.g. PlaceP. However, such assumption would still incur in the linearisation problems triggered by the FSEQ, when Boolean SSPs would be involved, as two PlacePs would be in need of linearisation. Overall, a cartographic approach such as Fábregas (2007) could still trigger the same problems as those found in the PtP hypothesis, to a good extent. While these problems seem not to be insurmountable for either approach, they suggest that a more flexible account to the syntactic structure of SSPs is called for.

Summing up, once we look at both descriptive and theoretical analyses of SSPs, we can conclude that there are still several data that need to be accounted for, under a unified approach. Three problems seem to be particularly stringent, as they seem beyond the coverage of current proposals.

First, we must account that SSPs involve several morphological units, which may have a flexible realisation, since we can find both simple (e.g. *en*) and complex SSPs (e.g. *a la izquierda de*). Given that Boolean SSPs may involve even more complex structures, the cartographic assumption that there is one sequence of “functional” Heads in SSPs seems too strong, or even incorrect. So, our account must correctly represent this complexity, while at the same time it must not fall into linearisation paradoxes that seem to occur in other approaches.

Second, we must also account that these structures seem to be partitioned in two “units”, when syntactic processes such as argument demotion and *dónde*-questions are involved. So, we need a structural account of SSPs which correctly partitions the morphemes making up an SSP into given syntactic units, onto which syntactic processes can then operate.

Third, we must account the intuition that SSPs can combine with both static (e.g. *estar* ‘to be’) and dynamic (e.g. *ir* ‘to go’) Verbs. So, their *compositional* interaction with Verbs determines whether they are interpreted as denoting a position, or a transitory point in an event of motion. However, this account must emerge from a more basic account of SSPs and their compositional semantics, which can also capture the semantic aspects of argument demotion and *dónde*-questions data. I offer our attempt to account these facts in a systematic way in the next section.

3. The Proposal: A Type-Logical Fragment of SSPs

The goal of this section is to outline our theoretical proposal, and discuss how we can use it solve our empirical problems. I follow this plan. I present a type-logical to syntactic structures and derivations that implements assumptions found in various minimalist approaches (Hale & Keyser’s “lexical syntax”; Phillips’ “Parser is Grammar”) (section 3.1). I discuss how I implement this approach to account and *predict* the morpho-syntactic data discussed so far (section 3.2). I offer a situation semantics interpretation of this fragment (section 3.3), and discuss how it can account the semantic data we discussed, from Verb-SSP interaction to direct composition

¹² To the best of our understanding, it is not clear how a Cartographic Approach would *not* allow that specific sub-types of *dónde*-questions would exist, as combinations of a *wh*- morpheme with some bundle of features that requires e.g. an A-part Phrase as a necessary answer. I think that, under the current assumptions in this framework, *overgeneration* of possible constituents and structures is a problem that could extend to our SSP data as well (see Nilsen 2003; for discussion). Again, while by no means a fatal flaw in the theory, this is another problem that awaits a solution, in this framework.

(section 3.4). I conclude the section by discussing how our proposal extends, and possibly improves, previous proposals on SSPs (section 3.5).

3.1. *The Analysis, Syntax: A Type-Logical Fragment for SSPs*

In the previous section, I concluded that both the PtP model and Fábregas (2007)'s approach to SSPs would face certain empirical challenges, when one attempts to extend them to cover our novel data. Boolean and other types of complex SSPs require a structurally more flexible approach than the one proposed in these works.

Our goal in this section is to offer an accurate syntactic treatment of SSPs that overcomes these difficulties. For this reason, I adopt a simplified fragment of a *type-logical* or *combinatorial grammar* syntactic calculus (Morryll 1994, 2011; Jacobson 1999; Steedman 2000, 2012; Jäger 2005; Moortgat 2010; a.o.). Our reason for this choice of type-logical calculi (henceforth: TL calculi) is three-fold.

First, TL calculi operate at a certain level of syntactic abstraction that easily permits representing how parts of speech can vary in their structural status. Recall that our data suggest that SSPs have a complex morpho-syntactic structure, in which some elements are bundled together, as distinct constituents of a Prepositional Phrase. For instance, *a traves* appears to involve two units that at the same “time” act as a Phrase within the “larger” SSP *a traves de la calle*. Within a TL approach, the different aspects of these morpho-syntactic structural relations can be explicitly (and formally) represented and captured.

Second, TL calculi allow to explicitly represent how syntactic structures are *dynamically* derived: how sentence structures are assembled via the combination of lexical items, via simple combinatoric principles. At the same time, these calculi allow to explicitly state *when* further syntactic operations can operate on syntactic structures. So, they will allow us to explicitly state when argument demotion is licensed and which units it demotes (i.e. when we have *enfrente (de la casa)*), as well as how *dónde*-questions are licensed, and why they require SSP Phrases as answers.

Third, TL calculi allow offering a simple semantic treatment of SSPs that directly stems from the interpretation of their syntactic structure. Via a principle known as the *Curry-Howard isomorphism*, we have a one-to-one correspondence between syntactic type (e.g. Head, argument) and its interpretation in a model (e.g. relation, argument). So, the types of meanings of the morphemes making up an SSP Phrase such as *enfrente de la sala* can be transparently derived from their syntactic type (Moortgat 2010; Asher 2011; Morryll 2011; a.o.). As we are going to see in section 3.4, with this principle and standard assumptions about function application, I will be able to give a simple and yet accurate *compositional* semantics for SSPs, as per *desiderata*.

I turn to our compact presentation of our TL fragment. The pre-theoretical intuition behind these approaches is simple, and can be explained as follows¹³. In TL calculi, Lexical Items are represented as either “complete” or “incomplete” syntactic units. Complete syntactic units are units that correspond to fully derived syntactic structures, such as Phrases and sentences, and do not need to combine with other parts of speech. Incomplete syntactic units are Lexical Items that need to combine with other items, to form complete syntactic structures. Heads usually require Complements and Specifiers to form Phrases, so they can be seen as such incomplete units. So, while *de* ‘of’ requires two arguments to form a Phrase (i.e. *enfrente de la sala* ‘in front of the room’), *la sala* does not require other lexical items, to form a complete DP Phrase.

¹³ Our treatment is based on Jäger (2005: ch. 1-2), although I offer a less thorough, but still precise and formal fragment. I clarify when I implement other proposals in this fragment.

So, the derivation of sentence structures is represented as the combination of syntactic units that form complete syntactic units or sentences. I now turn to more formal matters, and spell out our assumptions.

First, I assume that syntactic units are combined together via the *Merge* operation. In TL calculi, Merge acts as a *combinator*, a connective that combines Lexical Items. It may combine constituents together, or turn them into a single unit (Jäger 2005: ch.1). So, this combinator resembles the Merge operation also found in other minimalist approaches (cf. Chomsky 1999: 2-4).

Second, I assume that structural information is encoded as information about the basic units that can be merged together. I take that the most basic or atomic type is the “argument”, or saturated Phrase. Since at some level all types can act as arguments, when properly saturated, then all types must contain this information in their structure. I represent this type as *p*, which is a mnemonic for “Phrase”. I then take that more complex types can be defined via the Merge operation, which I represent via the connective “/”. This connective represents Merge as an operation that is *binary*, *associative* and *idempotent*. I first spell out an informal description of these operations; I then spell out a formal one, so that their theoretical and empirical appeal should be clear. First, this operator takes two units and merges them into one unit (binary property). Second, the order of application is not crucial, as long as the combined units are preserved (associativity). Third, if two constituents of the same type are combined, then the result will yield the same type (idempotence). I spell out the rules of formation of complex syntactic types below:

- (45)
- | | |
|---|--------------------|
| 1. <i>p</i> is a syntactic type | (lexical type) |
| 2. If <i>x</i> is a type and <i>y</i> is a type, then <i>x/y</i> is a type | (type formation) |
| 3. If <i>x/y</i> is a type and <i>y</i> is a type, then $(x/y)/y=x$, $y/(y/x)=x$; | (type reduction) |
| 4. Nothing else is a type; | (closure property) |

The rules in (45) read as follows. Given the atomic (“lexical”) type of arguments *p* (rule 1), then one can recursively construct more complex types as the “combination” of two (more) basic types (rule 2). Conversely, if one merges a complex type with a simple type, the result will be a “lower” type (rule 3). No other options are available, via these rules. Syntactic types must be combinations of *p* and Merge as a combinator (rule 4). I discuss the import of Merge’s properties in more detail as soon as they will become relevant, during the discussion of our data. The implicit assumption behind this definition is that I recursively define the lexical properties of all and only our SSPs via one basic type, that of Phrases *p*. This assumption differs from standard treatments in TL calculi, in which the set of types contains more descriptively oriented objects (e.g. *np*, *n*, etc.). To make this assumption explicit, I motivate our choice by spelling out our assumptions about lexical types.

Third, I adopt the “Lexical Syntax” approach to Lexical Categories of Hale & Keyser (2002) (henceforth: HK), as a basic theory of types for our fragment. The approach outlined in HK centres on one core assumption. There is a distinction between morpho-syntactic lexical categories¹⁴ and their “abstract” status, as either heads or arguments. Syntactic categories or “types” are the result of a combination of

¹⁴ One subtle difference between HK and other minimalist frameworks (e.g. Cartography) is that HK’s lexical approach treats “Lexical” categories as the combination of a “root” element with abstract (functional-like) syntactic “types”. So, HK’s “lexical” categories should be best seen as hybrid categories (i.e. partly functional). Our TL fragment is entirely consistent with this view, as it will become clear in the remainder of the paper.

a Head, as a relational element, and the amount of arguments it can combine with. If one follows the standard X'-bar schema (e.g. Haegeman 1994; a.o.), then a head can take 0, 1 or 2 arguments. When a head combines with one argument: one can have either Specifier-Head or Head-Complement configurations. These possible configurations define four syntactic *types*, illustrated in (46) (HK: pp. 13-14):

- (46) a. [Head [Complement]] (a-type)
 b. [[Specifier] Head [Complement]] (b-type)
 c. [Specifier] *Head [Complement]] (c-type)
 d. [Head] (d-type)

The intuition behind HK's proposal is that morpho-syntactic ("concrete") verbs, prepositions, nouns and adjectives can instantiate any the abstract syntactic structures in (46a)-(46b). Obviously, certain instantiation patterns seem to be favoured in a given language. Examples include (b)-type for Prepositions or (d)-type for nouns in English, (b)-type for nouns in Warlpiri¹⁵, among others (HK: ch.1). That is, there is no fixed correlation between morpho-syntactic classes and structural types, although certain patterns are more common than others, in a given Language. So, a "Preposition" can instantiate a head that can combine with zero, one or two arguments, but also an argument of another "Preposition", in its saturated format. The syntactic context determines its syntactic status. In our TL fragment, I translate these four types as per identities in (47):

- (47) a. [Head [Complement]]= p/p
 b. [[Specifier] Head [Complement]]= $p/p/p$
 c. [Specifier] *Head [Complement]]= $p/*p/p$
 d. [Head]=[Phrase]= p

These typed structures explicitly represent that, via Merge as a type-formation operation, we can have 1-place and 2-place predicates, as implicitly expressed in HK. Heads, Phrases and intermediate constituents can now be explicitly represented as typed syntactic units. As it will become clear in the next section, I will mostly employ the types (a), (b) and (d), which I will call p/p -units, $p/p/p$ -units and p -units, respectively. Because of HK's distinction between morpho-syntactic and abstract type, I assume that Lexical Items can be *polymorphic*. They can receive a different type, which depends on the "role" they play in a syntactic derivation (argument or Head). This is a common assumption in TL calculi, which usually define subtle systems to capture this syntactic "flexibility" of Items (Moortgat 2010: §2; Morryll 2011: ch.1; a.o.). I will discuss in the next section when this aspect comes into play, in our analysis¹⁶. Our final theoretical assumption pertains to how these units are dynamically merged together, into more complex structures, such as words, Phrases and Sentences.

Fourth, I adopt a top-down model to sentence derivation, as in Morryll (1994, 2011) or, in other minimalist frameworks, the *Parser Is Grammar* of Phillips (1997,

¹⁵ Warlpiri is an Australian language, mostly spoken in the Northern Territory region around Uluru.

¹⁶ The use of this "basic" form of polymorphism allows us to avoid more complex assumptions on how types mismatches are resolved, complications that arise in calculi in which more "naive" type sets are taken as primitives (e.g. Morryll 1994, 2011; a.o.).

2003, 2006) (henceforth PIG)¹⁷. I hence assume that constituents are merged as if they were added “left-to-right”. Roughly, a sentence such as *Mario loves Peach* (see ex. (39)) involves the merge of the DP *Mario* and the V *loves*, forming a V' constituent, *Mario loves*. This V' constituent is merged with the DP *Peach*, the result being the VP *Mario loves Peach*. In other words, I adopt the *Merge right* principle, as also found in PIG. The *Merge right* principle corresponds to the (right-)associative property of Merge, since it “rewrites” structures, as new material is added. Before I can offer an analysis of how our TL calculus can account the data, I need to spell out a final assumption about how derivations unfold over time.

Fifth, I use elements from an *Index Set I*, on the left side of derivations, to represent each step in the derivation (e.g. t , $t+1$, etc.). These elements belong to the pre-order $\langle I, + \rangle$, with “+” representing the *addition* operation. Although binary, the addition operation is not associative nor idempotent: it only allows us to progressively add intervals in the derivation. I explicitly mark each operation used in a derivational step, as either *Lexical Selection*, the introduction of a new lexical item in a derivation, or *Merge introduction*. This notation is consistent both with categorial and minimalist approaches (Jäger 2005; Horstein, Grohmann & Nunes 2006; a.o.), and allows us to define a simple “syntactic calculus” for sentences. I offer a sample derivation to show how our fragment derives the sentence *Mario loves Peach*:

- (48) Mario loves Peach
 (49) t . [Mario_p] (Lexical Selection)
 $t+1$. [loves_{p/p/p}] (Lexical Selection)
 $t+2$. [Mario_p]/[loves_{p/p/p}]=[_{p/p}[Mario_p] loves_{p/p/p}] (Merge Introduction)
 $t+3$. [Peach_p] (Lexical selection)
 $t+4$. [_{p/p}[Mario_p] [loves_{p/p/p}]]/[Peach_p]=[_p[Mario_p]loves_{p/p/p}[Peach_p]] (Merge Introduction)

The sample derivation in (49) reads as follows. The DP *Mario*, as a *p*-unit, is merged with the V(erb) *loves*, a *p/p/p*-unit. The V' *Mario loves* is obtained, as a *p/p*-unit, which is then merged with the DP *Peach*, also a *p*-unit. The result, leaving aside functional projections of any sort, is a Verb Phrase, which is in turn a *p*-unit, much like the “basic” DPs that act as arguments. This Verb Phrase also obviously coincides with the descriptive notion of a sentence, at least insofar as I leave aside functional, clause-bound categories. If I observe that a sentence such as (48) can be the complement of a propositional attitude verb (e.g. *I believe that Mario...*), then this choice seems syntactically accurate. Our concern, however, is not to discuss more in detail these theoretical aspects, but analyse how I can implement our fragment to account our data.

3.2. The Analysis, Syntax: The Data

The goal of this section is to show how our “enriched” TL calculus can account the data discussed in section 2. I further split our discussion in two sections that cover basic structural data, and syntactic processes, respectively (sections 3.2.1., 3.2.2.).

¹⁷ Both these dialects of TL calculi and PIG assume that sentence *production* mirrors sentence *comprehension*, as in psychologically oriented models of production (Levelt 1989; Baayen & Schreuder 2003; Jarema & Libben 2007; a.o.). I maintain that this assumption is another point in favour of this general approach, although I will offer more specific reasons in the rest of the paper.

3.2.1. *The Analysis, Syntax: Syntactic Structures*

I start by presenting our analysis of SSPs and their structure. I follow both the PtP model and HK's analysis of English Spatial Prepositions, as I assume that SSPs involve at least two distinct syntactic units. I choose to follow one assumption found in HK, the "P-within-P hypothesis" (HK: ch.4). According to this hypothesis, Spatial Ps have a recursive structure, in which one P acts as an argument of another P, sitting in Specifier position, while the second argument is the ground DP, in Complement position. Heads can be phonologically null, although they are still part of a syntactic structure. According to this hypothesis, possible structures for SSPs are:

- (50) a. [next] to [the room]
 b. [in] (at) [the room]
 c. [junto] a [la sala]
 d. [en] (P) [la sala] (ex. (1))
 e. [[[a] (P) [traves]] de [la calle] (ex. (3))
 f. [debajo] de [la mesa] (ex. (17))
 g. [delante] de [la casa] (ex. (18))
 h. [por] entre [las sillas] (ex. (19))
 i. [[[de] (P) [debajo]] de [la mesa] (ex. (23))
 j. [[[junto] y [delante]] de [la casa] (ex. (13))

The structures in the examples (50a)-(50b) say that the PP *next to the room* involves the P *to* as a Head, and the P *next* as a "noun-like" argument in Specifier position. The DP *the room* is instead the constituent in complement position. According to HK, The bracketed P "(at)" is a P that denotes a general spatial relation, and seems to be part of several Ps which can be labelled as mono-morphemic. The structures in (50c)-(50j) show that SSP(P)s such as *junto a la sala*, *en la sala* can find a parallel structural account, within this hypothesis, with the silent P re-labelled as "(P)". Note that the structure in (50e) for *a través de* requires a clarification about our hypothesis that I are going to offer within a few paragraphs. Interestingly, these data seem to suggest that the differences between English and Spanish can be reduced to the different phonological realisations between these two Languages. So, we can safely assume that their syntactic structures are equivalent, in the sense that they share the same syntactic properties. This list also shows that the P-within-P hypothesis takes a different stance from the PtP hypothesis, as it assigns a different syntactic status and "position" to the involved morpho-syntactic units. In our fragment, this hypothesis takes a specific shape on how the structure of an SSPP is derived, as (51) shows:

- (51) *t.* [junto_P] (Lexical Selection)
t+1. [a_{P/P/P}] (Lexical Selection)
t+2. [junto_P]/[a_{P/P/P}]=[_{P/P}[junto_P] a_{P/P/P}] (Merge Introduction)
t+3. [la sala_P] (Lexical Selection)
t+4. [_{P/P}[junto_P] a_{P/P/P}]/[la sala_P]=[_P[junto_P] a_{P/P/P} [sala_P]]
 (Merge Introduction)

The derivation in (51) says that the SSP Phrase *junto a la sala*, from (50b), is derived by merging the "P" *junto*, taken as the internal P, with the relational element *a* representing HK's realisation of the abstract spatial relational element. As it should be obvious, we abstract away from more specific labels such as "A_{xpart}" or "Kase" in our exposition. I will be mostly concerned with the role of abstract syntactic units in

derivations, so I will not look at the morpho-syntactic, descriptive status of these units. We will return to this aspect, and the FSEQ linearisation problem only in section 3.5. This derivation can also represent the derivations that would obtain the SSP Phrases *en la sala*, *debajo de la mesa* and *delante de la casa*, as these Phrases involve the merging of an internal P with a relational element, a phonologically null Head and the relational morpheme *de* ‘of’, respectively. I offer the actual derivations that generate these SSP Phrases in examples (52)-(54):

- (52) t . [en_p] (Lexical Selection)
 $t+1$. [(P) $_{p/p/p}$] (Lexical Selection)
 $t+2$. [en_p]/[(P) $_{p/p/p}$]=[p/p [en_p] (P) $_{p/p/p}$] (Merge Introduction)
 $t+3$. [$la\ sala_p$] (Lexical Selection)
 $t+4$. [p/p [en_p] (P) $_{p/p/p}$]/[$la\ sala_p$]=[p [en_p] (P) $_{p/p/p}$ [$la\ sala_p$]] (Merge Introduction)
- (53) t . [$delante_p$] (Lexical Selection)
 $t+1$. [$de_{p/p/p}$] (Lexical Selection)
 $t+2$. [$delante_p$]/[$de_{p/p/p}$]=[p/p [$delante_p$] $de_{p/p/p}$] (Merge Introduction)
 $t+3$. [$la\ casa_p$] (Lexical Selection)
 $t+4$. [p/p [$delante_p$] $de_{p/p/p}$]/[$la\ casa_p$]=[p [$delante_p$] $de_{p/p/p}$ [$la\ casa_p$]] (Merge Introduction)
- (54) t . [por_p] (Lexical Selection)
 $t+1$. [$entre_{p/p/p}$] (Lexical Selection)
 $t+2$. [por_p]/[$entre_{p/p/p}$]=[p/p [por_p] $entre_{p/p/p}$] (Merge Introduction)
 $t+3$. [$las\ sillas_p$] (Lexical Selection)
 $t+4$. [p/p [por_p] $entre_{p/p/p}$]/[$las\ sillas_p$]=[p [por_p] $entre_{p/p/p}$ [$las\ sillas_p$]] (Merge Introduction)

The derivations in (52)-(54) should by now be easy to read. Intuitively, these derivations show that our variant of the P-within-P hypothesis can account both “novel” complex SSPs, which involve the seldom discussed *de/a* paradigm, and simple SSPs, e.g. *en*. I offer a generalised approach by suggesting that these SSPs involve a phonologically null head “(P)”, rather than by involving a “simpler” structure, as in the PtP model. So, our fragment can offer a unified approach for at least three distinct descriptive types of SSPs, those that we discussed in section 2.1. Note that the SSPs that arise by simple juxtaposition of “simple” SSPs, such as *por entre* in (54), can receive a simple account that parallels the ones offered for other SSPs. Our minimal divergence from the PtP model is that I do not treat the “first” SSP to be a distinct Head, but rather a Phrase that sits in Specifier position of the “second”, relational SSP (*entre*). A similar analysis is however suggested, on a related set of data (i.e. directional uses of *a*), in Demonte (2011: §4.2), which therefore lends support to our TL version of the P-within-P hypothesis.

The P-within-P hypothesis, however, makes no further claims beyond assuming that one argument-like P sits in the Specifier position of a Head P. So, this hypothesis seems not to offer an account for our data that involving more complex SSPs, such as *en frente de*, *a la izquierda de*, or the Boolean type (*junto y delante de*). For our TL approach, this is not a problem. Our *recursive* definitions actually *predict* that argument Ps can correspond to *p*-units that have their own internal structure. In our approach the Specifier P must be a *p*-unit, but it can either be merged as a “simple”

unit, or as a Phrase that reflects the result of a previous syntactic sub-derivation. In words, both *junto* and *a traves* are typed as *p*-units, but the second item receives this type once *a* and *traves* are merged together in a Phrase. I next offer a derivation for the more complex SSPP *a traves de la calle* to illustrate this point (ex. (3), (50e)):

- (55) t . [a_p] (Lexical Selection)
 $t+1$. [(P) $_{p/p/p}$] (Lexical Selection)
 $t+2$. [a_p]/[(P) $_{p/p/p}$]=[$_{p/p}$ [a_p] (P) $_{p/p/p}$] (Merge Introduction)
 $t+3$. [$traves_p$] (Lexical Selection)
 $t+4$. [$_{p/p}$ [a_p] [(P) $_{p/p/p}$]]/[$traves_p$]=[$_{p/p}$ [a_p] (P) $_{p/p/p}$ [$traves_p$]] (Merge Introduction)
 $t+5$. [$de_{p/p/p}$] (Lexical Selection)
 $t+6$. [$_{p/p}$ [a_p](P) $_{p/p/p}$ [$traves_p$]]/[$de_{p/p/p}$]]=[$_{p/p}$ [$_{p/p}$ [a_p](P) $_{p/p/p}$ [$traves_p$]] $de_{p/p/p}$] (Merge Introduction)
 $t+7$. [$la\ calle_p$] (Lexical Selection)
 $t+8$. [$_{p/p}$ [$_{p/p}$ [[a_p] (P) $_{p/p/p}$ [$traves_p$]] $de_{p/p/p}$]]/[$la\ calle_p$]=[$_{p/p}$ [$_{p/p}$ [a_p] (P) $_{p/p/p}$ [$traves_p$]] $de_{p/p/p}$ [$la\ calle_p$]] (Merge Introduction)

In words, the derivation in (55) says that the internal P *a traves* is first formed, by also merging a phonologically null P (steps t to $t+4$). Then, the resulting Phrase, a *p*-type unit, merges with the head *de* and the other argument, *la calle*. The SSPP *a traves de la calle* is obtained as a result (steps $t+5$ to $t+8$). The syntactic process that generates this SSPP is structurally the same as the one that generates *junto a la sala*, although it involves the iterated merged of “more” units¹⁸. As in the previous case, we can assume that similar SSPPs are the result of isomorphic derivations. For instance, *a la izquierda de la bicicleta* can be generated via a structurally isomorphic derivation, which I offer for the sake of explicitness:

- (56) t . [a_p] (Lexical Selection)
 $t+1$. [(P) $_{p/p/p}$] (Lexical Selection)
 $t+2$. [a_p]/[(P) $_{p/p/p}$]=[$_{p/p}$ [a_p] (P) $_{p/p/p}$] (Merge Introduction)
 $t+3$. [$la\ izquierda_p$] (Lexical Selection)
 $t+4$. [$_{p/p}$ [a_p] [(P) $_{p/p/p}$]]/[$la\ izquierda_p$]=[$_{p/p}$ [a_p] (P) $_{p/p/p}$ [$la\ izquierda_p$]] (Merge Introduction)
 $t+5$. [$de_{p/p/p}$] (Lexical Selection)
 $t+6$. [$_{p/p}$ [a_p] (P) $_{p/p/p}$ [$la\ izquierda_p$]]/[$de_{p/p/p}$]=[$_{p/p}$ [$_{p/p}$ [a_p] (P) $_{p/p/p}$ [$la\ izquierda_p$]] $de_{p/p/p}$] (Merge Introduction)
 $t+7$. [$la\ bicicleta_p$] (Lexical Selection)
 $t+8$. [$_{p/p}$ [$_{p/p}$ [[a_p] (P) $_{p/p/p}$ [$la\ izquierda_p$]] $de_{p/p/p}$]]/[$la\ bicicleta_p$]=[$_{p/p}$ [$_{p/p}$ [a_p] (P) $_{p/p/p}$ [$la\ izquierda_p$]] $de_{p/p/p}$ [$la\ bicicleta_p$]] (Merge Introduction)

¹⁸ The careful reader will have noticed that juxtaposed SSPs could also be analysed along these structural lines: *por entre las sillas* could correspond to the structure [[[*por*] (P) [*entre*]] (P) [*las sillas*]]. This structure seems intuitively more appropriate for juxtaposed SSPs such as *de encima de* ‘from on top of’. In these SSPs, the two juxtaposed SSPs belong to two descriptively distinct classes, which involve at least one phonologically realised head (the second *de* ‘of’). Since I think that nothing crucial hinges on the choice of a specific analysis for this descriptive class, I leave open the matter on which analysis is more adequate to generalise the data.

The derivation in (56) should be easy to read. I note the following two aspects. First, I treat *a*, literally ‘at’, as a *p*-unit that expresses a certain general position, akin to its English counterpart *to*. Again, a similar analysis is suggested in Demonte (2011: §4.2). This is consistent with the intuition that Lexical Items can be polymorphic, and can enter syntactic derivations as different types of (lexical) units. Second, I treat the DP *la izquierda* ‘the left’ as a *p*-unit, ignoring the internal structure of this DP as we do for the ground one. I note in passing that, since we are not committing ourselves to FSEQ-like (rigid order) assumptions the clausal spine, this assumption is not structurally problematic. For us, what matters is not whether certain constituents appear in a given position, but rather whether they can play a certain role in syntactic derivations. With this analysis in hand, I can now explicitly show how Boolean SSPs such as *junto y delante de la casa* (ex. 50(j)) can be generated:

- (57) t . [junto_p] (Lexical Selection)
 $t+1$. [$y_{p/p/p}$] (Lexical Selection)
 $t+2$. [junto_p]/[$y_{p/p/p}$]=[$_{p/p}$ [junto_p] $y_{p/p/p}$] (Merge Introduction)
 $t+3$. [delante_p] (Lexical Selection)
 $t+4$. [$_{p/p}$ [junto_p] $y_{p/p/p}$]/[delante_p]=[$_{p}$ [junto_p] $y_{p/p/p}$ [delante_p]] (Merge Introduction)
 $t+5$. [$\text{de}_{p/p/p}$] (Lexical Selection)
 $t+6$. [$_{p}$ [junto_p] $y_{p/p/p}$ [delante_p]]/[$\text{de}_{p/p/p}$]=
[$_{p/p}$ [[junto_p] $y_{p/p/p}$ [delante_p]] $\text{de}_{p/p/p}$] (Merge Introduction)
 $t+7$. [la casa_p] (Lexical Selection)
 $t+8$. [$_{p/p}$ [[junto_p] $y_{p/p/p}$ [delante_p]] $\text{de}_{p/p/p}$]/[la casa_p]=
[$_{p}$ [[junto_p] $y_{p/p/p}$ [[delante_p]] $\text{de}_{p/p/p}$] [la casa_p]] (Merge Introduction)

As we can see, this derivation is structurally equivalent to that in (57), except for the specific Lexical Items that are merged in a sentence. Overall, with this derivation we can show one key aspect. Even the most “complex” SSPs, such as Boolean *junto y delante de*, are derived via the same principles by which “simple” SSPs are derived, as we predicted. We can now *predict* old and novel structural data about SSPs from section 2, a temporary exception being argument demotion and morphological data. We can do so, because we can show how SSPs are generated. That is, given our basic assumptions about the properties of the basic lexical items that SSPs involve, and the basic combinatoric properties of Merge, we generate the observed strings.

Before we discuss those sets of data, however, I need to make some technical observations about the derivations, which are tied to our choice about Merge and TL matters. Our choice to use one connective, “/”, is now justified by the Merge right principle. Since I assume that syntactic process combine “to the right”, the addition of “new” units and their merge with “old” ones automatically derives new, larger constituents. Since I have assumed that merge right is *associative*, when new heads are merged with a full phrase, their rightmost argument becomes an argument of the new head. This is particularly evident in steps $t+3$ to $t+6$ of (56). The P *en* temporarily enters the derivation as an argument of *o* ‘or’. Then, when the silent head “(P)” is merged, *en* becomes the argument of this head. Since associativity says that structures are re-arranged as long as they preserve the merged constituents, the local re-arrangement of constituents, as in (56) and other derivations, is predicted.

3.2.2. *The Analysis, Syntax: Morphological Data and Syntactic Processes*

Once we have clarified these subtle aspects about syntactic derivations, we turn our attention to the remaining morpho-syntactic data that we need to address. I start by analysing our morphological data, as their treatment allows us offer an analysis of argument demotion data, as a logical consequence. In section 2.2 we discussed the possibility that Specifier “Ps” can display their own morphological structure, in which one piece of functional morphology acts as an affix (prefix, e.g. *de-*) to a noun-like term (e.g. *-bajo*). The resulting Lexical Items can be part of more complex SSPs, such as the Boolean type (e.g. *encima o delante*, ex. (28)-(29)). Depending on which morpheme merges with the noun-like element, argument demotion can or must be licensed, too: *de-* may allow demotion, *a-* blocks the merge of any ground DP.

Our analysis of these data is a simple one: I assume that the single morphemes making up a *p*-unit in Specifier position are Lexical Items that receive a certain type, and are merged together accordingly. In making this assumption, I take a precise stance on the relation between morphology and syntax, which is definitely non-Lexicalist. That is, I basically blur the distinction morphology and syntax (Di Sciullo & Williams 1987; Ackema & Neeleman 2004; Lieber & Scalise 2006; Fábregas 2011; a.o.). As a result, our TL approach is close to HK or *Distributed Morphology* approach (Halle & Marantz 1993; Marantz 1997; Embick & Noyer 2001, 2006); *Nanosyntax* (Ramchand 2008; Starke 2009; a.o). Since these approaches stipulate one generative system for both levels, although in rather different formats, they closely resemble our TL analysis of these data¹⁹.

For these reasons, I contend that no specific morphological assumptions are necessary²⁰, for our data, since they all involve inherently syntactic problems. I motivate our contention as follows. In our proposal, the simplest account of these SSPs is that they involve the merge of a *p/p*-unit, the “prefix-like” unit, with a *p*-unit. For instance, the prefix *de-* merges with the free morpheme *bajo*, forming the SSP *debajo*. So, the morphological structure of these Ps can be accounted by the simple system of types I have defined for the syntactic structure of Ps. I show this account in (58), which uses the Items listed in (30) and (34):

- (58) *t*. [*de*-*p/p*] (Lexical Selection)
t+1. [*bajo*_{*p*}] (Lexical Selection)
t+2. [*de*-*p/p*]/[*bajo*_{*p*}]=[_{*p/p*}[*debajo*_{*p*}]] (Merge Introduction)
t+3. [*debajo*_{*p*}] (Lexical Selection)
t+4. [*de*_{*p/p/p*}] (Lexical Selection)
t+5. [*debajo*_{*a*}]/[*de*_{*p/p/p*}]=[_{*p/p*}[*debajo*_{*a*}] *de*_{*p/p/p*}] (Merge Introduction)
t+6. [*la mesa*_{*p*}] (Lexical Selection)
t+7. [_{*p/p*} [*debajo*_{*p*}] [*de*_{*p/p/p*}]]/[*la mesa*_{*p*}]=[_{*p*}[*debajo*_{*p*}] *de*_{*p/p/p*} [*la mesa*_{*p*}]] (Merge Introduction)

¹⁹ Ironically, an approach such as our TL fragment is usually labelled as a “Lexicalist” perspective on syntax, since lexical types entirely determine how derivations proceed. This aspect of the discussion is orthogonal to our concerns here, so the reader should not worry about the apparent conceptual clash among theoretical labels.

²⁰ Given the strong methodological and theoretical convergences of HK with Distributed Morphology, I also contend that our approach may be seen as fairly compatible with this morphological framework. I leave aside an in-depth discussion of convergences and divergences with this framework, as they are not crucial for our discussion.

Prefix-like elements are typed as *p/p*-units (e.g. *de-*), and merge with a *p*-unit element (e.g. *-bajo*). The result is a *p*-unit “P” (e.g. *debajo*). This derivation also represents that the result of this application of Merge is in turn an argument SSP, as I have assumed so far. The SSPs *alante*, *abajo* indeed can (and must) occur as arguments of a Verb. Note that our typing of these categories does not directly capture that these constituents can conflate into a single phonological unit. However, HK propose that this form of conflation can only occur when a head contains formal (phonological or “p-”) features (HK: ch.2-4). The morphemes *de-*, *a-* and *en-* seem excellent candidates, as one-place instances of their relational counterparts (i.e. *en*, *de* and *a*), hence inherently functional elements. We can now account and predict the morphological structures of SSPs, at least those visible to derivational processes, via the same theoretical tools that I employ for their Syntax.

Before I move to the argument demotion data, I briefly analyse the morpho-phonological differences among the allomorphs involved in these structures. In some cases, the conflated form of two morphemes displays forms of phonological “readjustment”. For instance, the conflation of *a-* and *-riba* yields the morpheme *arriba*. These Ps seem to involve different morphemes, or at least allomorphs. I think that, in these cases, the observed allomorphs are the result of a “Late Insertion” operation. This operation is post-syntactic, in the sense that it renders the output of syntactic derivations “legible” for the phonological component (Embick & Noyer 2001, 2006; Harley 2012; a.o.).

I now turn our attention to the argument demotion data. Both TL and minimalist approaches contend that argument demotion, as a form of ellipsis, involves the Merge of a constituent which has already been merged in a previous sentence or discourse. Examples include Jäger (2005); Morryll (1994, 2011) (a.o.), but also PIG and other generative-oriented proposals (Schwarzschild 1999; Merchant 2001, 2004; Phillips 2006; a.o.). Since the semantic contribution of an argument DP is in a sense “redundant” or “given”, this constituent is not realised at a *phonological* level. In our proposal, we can also offer a simple explanation, which is based on the following assumption, borrowed from PIG. Via the idempotence of Merge, a demoted constituent is a constituent that has already been merged and spelled out in a sentence.

Hence, it can be “absorbed” back in the structure, and left unpronounced²¹. The result of this operation must generate a “finite” sentence, i.e. a *p*-unit. So, argument demotion cannot just demote the argument DP, as this operation would yield a constituent of type *p/p*. It must also demote the Head that “extends” the structure, and allows the merging of the demoted argument. The derivations below, based on examples (37)-(38), show when this process can, or cannot occur. I label argument demotion as *Merge Elimination*, to capture that this operation “eliminates” merged constituents from the final structure for a sentence:

- (59) a. $t+8$. $[_p[_p[[a_p](P)_{p/p/p}[la\ izquierda_p]]]de_{p/p/p}[la\ mesa_p]]$
 $t+9$. $[_p[_p[[a_p](P)_{p/p/p}[izquierda_p]]]de_{p/p/p}[\cancel{la\ mesa_p}]]$
 (Merge Elimination)
- b. $t+8$. $[_p[_p[[en_p](P)_{p/p/p}[frente_p]]]de_{p/p/p}[la\ sala_p]]$

²¹ In TL calculi such as Jäger (2005) ellipsis, anaphora and other discourse-bound syntactic processes are accounted via the introduction of a specific combinator (e.g. “[”). This combinator establishes a structural relation with the anaphoric unit that licenses ellipsis. Our approach is consistent with this view, although it obviously lacks a precise implementation of this connective. Here I aim for simplicity rather than precision, so I defer a fuller analysis to another occasion.

- $t+9$. [_p/p[_p[[en_p] (P)_{p/p/p} [frente_p]]] de_{p/p/p} [~~la sala_p~~]=*
 (Illicit Merge Elimination)
- (60) a. $t+8$. [_p[_p[_p[[a_p] la_{p/p/p} [izquierda_p]]] o [delante_p]]] de_{p/p/p} [la mesa_p]]
 $t+9$. [~~_p[_p[[a_p] la_{p/p/p} [izquierda_p]]] o [delante_p]]] de~~_{p/p/p} [la mesa_p]]]
 (Merge Elimination)~~~~
- b. $t+8$. [_p[_p[[en_p] (P)_{p/p/p} [frente_p]]] de_{p/p/p} [la mesa_p]]
 $t+9$. [_p/p[_p[[en_p] (P)_{p/p/p} [frente_p]]] de_{p/p/p} [~~la mesa_p~~]=*
 (Illicit Merge Elimination)
- c. $t+8$. [_p[en_p] (P)_{p/p/p} [la sala_p]]
 $t+9$. [_p/p[en_p] (P)_{p/p/p} [~~la sala_p~~]=* (Illicit M.E., derivation crashes)

In these derivations, I follow the literature and mark demoted (“cancelled”) constituents via a strike. Once the syntactic process has derived a full sentence, then the phonological component can target for spell-out only those units which are “new” with respect to the sentence, or discourse. Units that have been already spelt out, such as *de* and *la mesa*, are not spelt out a second time. This is also consistent with the “Late Insertion” hypothesis, which assumes that phonological operations may avoid spelling out a constituent already present in a derivation (Halle & Marantz 1993; Embick & Noyer 2001, 2006; a.o.). For the same reason, when phonologically null Heads are merged in a derivation, demotion cannot occur. If demotion must target already present items, then in this case it simply cannot “find” a Head to demote. So, the argument is not demoted as well, hence we correctly *predict* that (60c), adapted from (7), is an ungrammatical instance of argument demotion.

So, at least for our argument demotion cases, we can conclude that our TL fragment can offer a simple account and make accurate predictions on which constituents are demoted. Importantly, these predictions are a consequence of our basic assumptions about syntactic structures and the operations we can perform on these structures. By assuming that argument demotion is a structure-preserving operation, we predict that demotion must “cancel” any intermediate structure. In plain words, if demotion targets a full phrase/sentence, then the result must also be a Phrase/sentence, so argument demotion must “cancel” constituents according to this principle. For this reason, *de* is also demoted, lest the output structure would not be of the same type of the input structure. For this same reason, though, simple SSP Phrases such as *en la sala* cannot undergo demotion. Since there is no way to preserve the input syntactic structure into the output structure, the operation is not possible.

I leave aside a more thorough discussion of these technical matters²², and I move onto the *dónde*-questions data, and what kind of account they can find in our TL fragment. I follow the analysis of *wh*-questions offered in Veeremat (2003) which, although based on a different type of TL approach than ours, is close enough that can be adapted with minimal changes. I do not wish to claim that our approach to these data is exhaustive, as only I give a basic syntactic analysis of *dónde*-questions. I leave a more accurate analysis for the future, as our account should be accurate enough to show *why* we can account our data within the set of assumptions of our fragment. Our simple analysis is as follows.

In Veeremat (2003), *wh*-questions are treated as unary operators that take constituents of a certain type as answers (e.g. PPs), and produce sentence types (i.e. answers) as a result. Although this work offers a more thorough analysis of *wh*-

²² I observe that, in assuming that these structural operations must be structure-preserving, I also follow more recent assumptions in various strands of the Minimalist Program, (e.g. PIG and HK's theory of Lexical Syntax). See Jäger (2005: ch.2) on this topic.

operators and their properties, this basic intuition about their lexical type assignment allows us to offer a unified account for *dónde*-questions. In our TL fragment, this type can be represented as the unary type p/p_{pp} , a type that takes an SSP Phrase as input, and returns the corresponding sentence as a result. Simplified derivations that illustrate this simple process, based on examples (39)-(42), are the following:

- (61) $t+k..$ Q: [p/p Dónde va/está Mario?] [Is Mario inside the room?]
 $t+k+1.$ A: {[p en la sala], [p por entre las sillas], [p delante de la silla],
 [p en frente de la silla], [p junto y delante de la silla], [p alante],
 [p en frente]], [p junto y delante], [p delante], * [p/p a (la sala)]}

Our simplified account in (61) should be read as follows. When a question is derived, as a p/p -unit, an answer must correspond to a p -unit that can act as a constituent that “saturates” the question type. Since a question can only take p -units as answers, possible answers must be assigned this type. The informally represented set of possible answers displayed in (61) captures this fact. SSP Phrases such as *en la sala*, *junto y en delante de las sillas*, *alante* can be answers to a *dónde*-question, as they all instantiate p -units.

Overall, our account actually predicts that SPP Phrases, regardless of their degree of complexity, form a unitary type, that of answers to *dónde*-phrases. Importantly, it predicts that the “internal” Phrase of a full SSP can also be an SSP Phrase in its own right, as *en frente* can be a possible answer, too. Note that our approach is simplified, in that we do not index the type of answers as a specific type of p -unit, and I leave aside the internal structure of the answer SSPs, or of the *dónde*-question. Again, this lack of precision in our analysis is not a concern, here. I also gloss on how our “demoted” answers can be derived, although I think that we can capture the most accurate proposals in the literature (e.g. Merchant 2001, 2004) via our apparatus²³. I do predict that, if demotion cannot apply, as for the case of ungrammatical **a (la sala)* ‘to/at the room’ (see (42)), then no equivalent demoted answer can occur. I represent this as marking this possible answer as ungrammatical, in (61). Hence, the set of possible answers in (61a) should be best seen as partitioned between grammatical and ungrammatical answers. The key aspect of this treatment is that now *all* of the syntactic data we discussed so far find an account, and a predictive one at that, in our TL fragment.

Overall, our proposal appears to be morpho-syntactically sound, since our TL fragment can capture all and only the data about SSPs that we discussed so far, in sections 1 and 2. This coverage is of course centred on structural data, not interpretive ones. However, the proposal can certainly offer a unified, thorough account of all the SSPs we discussed so far. Hence, it appears to be quite more successful in its empirical import than previous proposals on this category. Nevertheless, we still need to offer a semantic analysis on the interpretation of SSPs. We also need to explain

²³ A very approximate rendition of Merchant’s proposal is as follows. According to this approach, answers to questions are derived by moving an “answer Phrase” into a left-most functional position, and then elide the remainder of the sentence. In our approach, we can assume that a full sentence is derived as an answer; then, only the answer Phrase (e.g. an SSP Phrase) is spelt out. Roughly, the grammar first derives the structure [p Mario está en la sala], then it “cancels” everything except *en la sala*: we still get a p -unit as an answer (i.e. [p Mario está [p en la sala]]). So, we would ideally be able to capture this insight with fewer derivational approaches, since we do not need to resort to fixed positions. I leave to the reader the option of working out the exact details.

why most, if not all SSPs appear to be ambiguous between a static and a dynamic interpretation. I address this topic in the next section.

3.3. *The Proposal: The Semantics*

The goal of this section is to spell out our semantic analysis of SSPs. I implement a simplified variant of *situation semantics*. This variant follows some of the more “ontologically simple” proposals (Kratzer 1989, 2007; Barwise & Etchmendi 1990; Von Stechow 1994; a.o.). The key properties of this proposal are defined as follows.

First, I assume that all our syntactic types find their denotation in a domain of *Situations*. I assume that situations can also be seen as possible worlds, or parts thereof. Therefore, I assume that both individuals and spatial entities belong to this larger ontological domain. While DPs intuitively denote the *sub-types* of situations-as-individuals, SSPs denote the sub-type of situations-as-spatio-temporal entities, within the larger situational domain (cf. also Asher 2001: ch. 2-4). I spend a few words on this specific topic, to clarify our ontological assumptions.

In the literature, two proposals exist about the status of this sub-type. Event semantics proposals contend that spatial Ps denote relations over eventualities (states and events) (Parsons 1990; Kamp & Reyle 1993; Fong 1997; Kratzer 2003; Kamp, Van Genhith & Reyle 2005; a.o.). Other proposals contend that SSPs denote relations defined over more spatially oriented entities. Examples include Regions (Cresswell 1978; Nam 1995; Kracht 2002); Vectors (Zwarts 1997; Zwarts & Winter 2000); Paths (Jackendoff 1983, 1990; Zwarts 2005). Some proposals integrate both perspectives (e.g. Krifka 1998; Ramchand 2008; a.o.). These differences tend to be notational in nature, rather than empirically justified. At a certain level of analysis, all that matters is that SSPs also include an implicit referent of a spatio-temporal nature. For this reason, I just assume that SSPs denote relations over the sub-type of *spatial* situations, which I define below, in thorough detail.

Second, I assume that the domain of situations S is defined as an *infinitely denumerable* set $S = \{\emptyset, s, r, q, \dots, \{s, r\}, \dots, \{s, r, q\}\}$. This set includes both “atomic” situations such as s , and “non-atomic” or “structured” situations such as $\{s, r\}$, i.e. situations which have smaller parts in them. The structure of this domain corresponds to a *full Boolean algebra*, a partially ordered set that includes the empty set (cf. Keenan & Faltz 1985; Link 1998: ch.1; Landman 1991: ch.2-4; Landman 2004). I use *Quine’s innovation* and treat all “individuals” (e.g. a) as singleton sets (Schwarzschild 1996; a.o.). So, our situations can be seen as both sets and individual entities in discourse. For reasons of clarity, I drop brackets for singletons, representing them as a instead of $\{a\}$.

Third, our domain has a specific ordering structure. The *part-of* relation, “ \leq ”, defines how the elements in this set are ordered. If $a \leq b$ (read: a is part of b), then the following holds: $a \cup b = b$ and $a \cap b = a$. In words, if a is part of b , then the (set) union of the first with the second will give us the “bigger” set, while their intersection will give us the smaller set. So, situations may include other situations, as their distinct parts. This aspect will play a key role in our semantic treatment.

Fourth, I spell out the type of entities in this domain. The *semantic* type of this set is the set $TYPE = \{ \langle s \rangle \}$, which says that all elements in S are situations. From this basic type, I can define more complex types, via these recursive definitions:

- (62) 1. $\langle s \rangle$ is a type (Lexical Type)
 2. If $\langle a \rangle$ is a type and $\langle b \rangle$ is a type, then $\langle a, b \rangle$ is a type (Functional type)

3. If $\langle a, b \rangle$ is a type and $\langle a \rangle$ is a type, then $\langle a, b \rangle / \langle a \rangle = \langle b \rangle$
 (Function Application)
4. Nothing else is a type
 (Closure property)

Our definitions in (53) allow us to define *functions* and *relations* over S as complex (model-theoretic) objects. A function is a mapping from one situation to another situation, which I represent via the type $\langle s, s \rangle$. A relation is a mapping that takes another mapping as one of its arguments, which I represent as $\langle s, \langle s, s \rangle \rangle$. In words, a function takes one situation as an argument and returns another situation as an output. A relation takes two situations and takes returns a “structured” situation as an output. Nothing else can be an output of these rules. As a result, the closure set of our types is $TYPE' = \{ \langle s \rangle, \langle s, s \rangle, \langle s, \langle s, s \rangle \rangle \}$. In words, we have situations, functions over situations, and relations over situations as the full set of types in our domain, hence as possible denotations for our SSPs. I will discuss in more detail the different semantic types of situations we will encounter, though. Under our definitions, all entities in discourse are situations. However, I will still use labels such as “individuals”, for those situations denoted by DPs, or of regions/positions for SSPs. I will do, so, when this choice should make the presentation of the arguments clearer and more immediate, if only less precise ontology-wise.

Via these definitions, I can now offer a semantic treatment for all of our sentences. Before doing so, I first define an *isomorphism* between syntactic and semantic types. The intuition behind this isomorphism is simple. I treat *all* syntactic units that act as arguments of a head as denoting situations, semantic arguments in relations. I treat *all* syntactic units that act as 2-argument heads as denoting part-of relations among situations. I treat *all* 1-argument syntactic units as denoting functions. This isomorphism is an instance of the *Curry-Howard* isomorphism. Categorical grammars and TL syntactic models use this isomorphism to define the interpretation of sentences in a model (e.g. Morryll 1994; Steedman 2000, 2012; Jäger 2005; Moortgat 2010; a.o.). This mapping is shown in (54). I use a simple fragment of the λ -calculus for open formulae (Gamut 1991; Heim & Kratzer 1998):

(63) SYNTAX \Rightarrow SEMANTICS \Rightarrow INTERPRETATION

p/p	$\Rightarrow \langle s, s \rangle$	$\Rightarrow \lambda x. s : (x)$
$p/p/p$	$\Rightarrow \langle s, \langle s, s \rangle \rangle$	$\Rightarrow \lambda x. \lambda y. s : (x \leq y)$
p	$\Rightarrow \langle s \rangle$	$\Rightarrow s, s : (x), s : (x \leq y)$

The mapping in (63) says that each of our basic syntactic types has a matching semantic type. Two-place Heads denote relations, one-place Heads denote functions, Phrases and “bare” arguments denote single situations, which can be atomic or structured. In this latter case, the intuition is that both bare nouns and phrases can denote the same type of referent in discourse, although they do so in a different way. Since phrases correspond to the result of merging a Head with two arguments, they denote a relation in which both the argument “slots” are saturated via λ -conversion, what I call a *structured situation*. I clarify the nature of these situations, as they will play an important part in our semantic analysis.

Structured situations can be defined as (saturated) restricted relations, in which the “bigger” situation s represents the implicit referent of e.g. standard event or situation semantics. Such structured situations, as saturated relations, can be restricted to those defined over specific domains. For instance, the structured situation in which the

correspond to the specific interpretation of lexical items in the model, rather than their morpho-syntactic or semantic structure. In other words, the exact meaning of *loves* depends on its lexical content (which relation it individuates), but this Verb shares a relational part with any other 2-place Heads, as we would expect. I discuss these differences in thorough detail, but in the next section.

3.4. *The Data, Semantics: The Semantics of SSPs*

The goal of this section is to offer a compositional semantics of our SSPs data and sketch treatments of the demotion, question and Verb distribution data we discussed so far. In this way, I aim to fully account the old and novel data discussed in section 2. I also split this section in two smaller sections, which discuss the problem of direct compositionality and other semantic topics, respectively (section 3.4.1, 3.4.2).

3.4.1. *The Data, Semantics: direct compositionality*

I start with the *proviso* that I defer to section 3.5. a discussion of how our situation-based approach compares to other semantic approaches of SPs (Nam 1995; Zwarts & Winter 2000; a.o.). In this section, I only focus on explaining how we can account the data we discussed so far. For expository purposes, we talk about either spatial situations, regions or positions whenever we discuss the semantic content of SSPs, depending on which label makes the discussion more intuitive.

Since we now have a thorough syntactic treatment of SSPs and a precise hypothesis on how SSPs can (and must) be interpreted, we can analyse their interpretation in detail. One key aspect of our interpretation of the TL fragment is that the differences in meaning among SSPs depend on their lexical content, i.e. which spatial situations each “internal” SP denotes in a model. The difference in interpretation of *encima de* and *debajo de* depends on *sobre* ‘above’ and *debajo* ‘below’ denoting distinct positions that the figure can occupy, with respect to the ground. The semantic contribution of *de* ‘of’ should be precisely the same in both SSPs, and intuitively correspond to that of introducing a spatial relation between ground and related position. Intuitively, SSPs should have a purely compositional Semantics.

To illustrate this point, I show how the interpretation of *encima de la mesa* and *en la sala*, from (2) and (50d) respectively, can be derived. Since *p*-units can correspond to distinct types of situations, I assume for the moment that simple Items such as the ground DP and the “internal” SSP correspond to non-logical constants, e.g. *sb* for the vertical, positive position denoted by *sobre*. The same assumption holds for *en*, which I translate as *e*. I clarify the import of this assumption after I present the corresponding derivation. I then assume that *de*, like its counterpart *of*, denotes a general part-of relation, is which restricted to a spatial (mereological) relation via combination with its arguments (cf. Nam 1995; Landman 2004; a.o.). I make the same assumption for the phonologically null head “(P)”. Look at (65)-(66):

- | | | | |
|------|------------|--|------------------|
| (65) | <i>t</i> | [[encima]]= $ec_{<s>}$ | (Interpretation) |
| | <i>t+1</i> | [de]]= $\lambda x.\lambda y.s:(x\lesssim y)_{<s<s,s>>}$ | (Interpretation) |
| | <i>t+2</i> | ([[encima]])/[de]]= $(ec)\lambda x.\lambda y.s:(x\lesssim y)=\lambda y.s:(ec\lesssim y)_{<s,s>}$ | (Function A.) |
| | <i>t+3</i> | [[la mesa]]= $m_{<s>}$ | (Interpretation) |
| | <i>t+4</i> | [[encima de]]/([[la mesa]])= $\lambda y.s:(ec\lesssim y)(m)=s:(ec\lesssim m)_{<s>}$ | (Function A.) |
| (66) | <i>t</i> | [[en]]= $e_{<s>}$ | (Interpretation) |
| | <i>t+1</i> | [(P)]]= $\lambda x.\lambda y.s:(x\lesssim y)_{<s<s,s>>}$ | (Interpretation) |

- $t+2.$ $([[\text{en}]])/[[(P)]]=\langle e \rangle \lambda x. \lambda y. s. (x \leq y) = \lambda y. s. (e \leq y)_{\langle s, s \rangle}$
 (Function Application)
- $t+3.$ $[[\text{la sala}]]=c_{\langle s \rangle}$
 (Interpretation)
- $t+4.$ $[[\text{en} (P)]]/([[\text{la sala}]])=\lambda y. s. (e \leq y)(c) = s. (e \leq y)_{\langle s \rangle}$
 (Function application)

These derivations read as follows. The SSP Phrase *encima de la mesa* denotes a structured spatial situation in which a vertical, positive region is defined with respect to a given table, as a ground. Intuitively, this is an adequate interpretation for this Phrase, and it is obtained in a purely compositional way. The SSP Phrase *en la sala* denotes a structured spatial situation that corresponds to the room's interior part, taken as a “whole” position. So, both “simple” and “complex” classes of SSPs seem to find an straightforward and homogeneous analysis in our fragment. However, before moving to structurally more complex SSPs, we discuss some more examples that find a straightforward analysis within our basic analysis. We discuss the interpretation of *junto a la sala* ‘next to the room’ and *por entre las sillas* ‘in between the chairs’, from examples (50c) and (50h) respectively:

- (67) $t.$ $[[\text{junto}]]=jn_{\langle s \rangle}$ (Interpretation)
- $t+1.$ $[\text{a}]]=\lambda x. \lambda y. s. at. (x \leq y)_{\langle s \langle s, s \rangle \rangle}$ (Interpretation)
- $t+2.$ $([[\text{junto}]])/[[\text{a}]]=\langle jn \rangle \lambda x. \lambda y. s. (x \leq y)_{\langle s \langle s, s \rangle \rangle} = \lambda y. s. at. (jn \leq y)_{\langle s, s \rangle}$
 (Function A.)
- $t+3.$ $[[\text{la sala}]]=c_{\langle s \rangle}$ (Interpretation)
- $t+4.$ $[[\text{junto a}]]/([[\text{la sala}]])=\lambda y. s. (jn \leq y)(c) = s. at. (jn \leq c)_{\langle s \rangle}$
 (Function A.)
- (68) $t.$ $[[\text{por}]]=pr_{\langle s \rangle}$ (Interpretation)
- $t+1.$ $[\text{entre}]]=\lambda x. \lambda y. s. en. (x \leq y)_{\langle s \langle s, s \rangle \rangle}$ (Interpretation)
- $t+2.$ $([[\text{por}]])/[[\text{entre}]]=\langle pr \rangle \lambda x. \lambda y. s. en. (pr \leq y)_{\langle s \langle s, s \rangle \rangle} = \lambda y. en. (pr \leq y)_{\langle s, s \rangle}$
 (F.A.)
- $t+3.$ $[[\text{las sillas}]]=ls_{\langle s \rangle}$ (Interpretation)
- $t+4.$ $[[\text{por entre}]]/([[\text{las sillas}]])=\lambda y. s. en. (pr \leq y)(ls) = s. en. (pr \leq ls)$
 (F.A.)

These derivations read as follows. The Lexical Item *a* in *junto a la sala* denotes a more specific type of spatial relation, which I label as the structured situation *at*. For the moment being, it suffices to say that this Head also has a spatial interpretation, as normally assumed in the literature (HK: ch.4; Demonte 2011; a.o.). We return to this topic, and to a more accurate analysis of *at* and its semantics, after example (71), when we will discuss the related argument demotion examples. The derivation in (68) presents a case of a juxtaposed SSP, *por entre* ‘among’, in which *entre* acts as a relational element, while *por* acts as an argument. Intuitively, this SSP Phrase denotes a structured situation in which a figure is located “inside” or “across” the intermediate (“between”) region of several chairs. In this case, *entre* acts as a restricted structured situation, as one would expect from its status as a syntactic Head. This is reflected by its interpretation being “ $\lambda x. \lambda y. s. en. (x \leq y)$ ” a spatial relation restricted to the “between” sub-type of relation (i.e. a relation involving two grounds).

The several other possible SSPs that fall within the juxtaposed class suggest that there is a direct relation between syntactic polymorphism and flexible semantics. The intuition is as follows. In our treatment of *p*-units (i.e. Phrases) SSPs, I have implicitly assumed that any “internal” situations are made opaque to interpretation, and that our

SSPs directly denote a certain type of situation. In other words, *encima* and similar other SSPs denote directly situations such as *sb*, rather than their more accurate counterparts, e.g. *s:ec* (i.e. an “encima” situation). When an SSP receives syntactic type $p/p/p$, it denotes the corresponding restricted relation, for instance $\lambda x.\lambda y.s:ec:(x\leq y)$. The semantic difference between these two possible interpretations is a compositional, not content-based one, since it pertains to the role that Lexical Items play in a syntactic structure. *Encima* can act as the argument of *de*, as in the examples we discussed, or it can directly be a relational Head, as in other dialects of Spanish than the ones discussed here. In both cases, it denotes a certain situation in Space, with respect to the ground²⁶.

I now discuss more complex classes of SSPs, including the Boolean type. A more complex case that shows how this semantics can give correct results is the interpretation of more complex SSP Phrases, such as *a través de la calle* ‘across the street’ (50e). I show this interpretation in (69):

- (69) t . $[[a]] = at_{<s>}$ (Interpretation)
 $t+1$. $[(P)] = \lambda x.\lambda y.s:(x\leq y)_{<s<s,s>>}$ (Interpretation)
 $t+2$. $([[a]])/[(P)] = (at)\lambda x.\lambda y.s:(x\leq y) = \lambda y.s:(at\leq y)_{<s,s>}$
(Function Application)
 $t+3$. $[[traves]] = tr_{<s>}$ (Interpretation)
 $t+4$. $[[a(P)]]/([traves]) = \lambda y.s:(at\leq y)(tr) = s:(at\leq tr)_{<s>}$
(Function Application)
 $t+5$. $[[de]] = \lambda x.\lambda y.s':(x\leq y)_{<s<s,s>>}$ (Interpretation)
 $t+6$. $([[a(P)traves]])/[[de]] = (s:(at\leq tr))\lambda x.\lambda y.s':(x\leq y) =$
 $= \lambda y.s':(s:(at\leq tr)\leq y)_{<s,s>}$
(Function Application)
 $t+7$. $[[la calle]] = ca_{<s>}$ (Interpretation)
 $t+8$. $[[a través de]]/([la calle]) = \lambda y.s':((s:(at\leq tr)\leq y))(ca) =$
 $= s':((s:(at\leq tr)\leq ca))_{<s>}$
(Function A.)

The more complex derivation in (66) reads as follows. The structured situation denoted by *a través* is a situation in which an “external” position is taken with respect to the “cross” section of a ground entity, a given stree in this case. Note again that I treat the phonological null head “(P)” as denoting a “silent” part-of relation, restricted to a spatial one via the semantic contribution of its arguments. The exact semantic content of this Phrase is not crucial, insofar we consider the resulting structured situation as part of a “larger” structured situation s' . This larger situation includes the *a través* situation, and says that such situation is part of the ground's space, as in the case of (65). In this case, our use of the situation “type” s' reflects that, when syntactic structure explicitly introduces the “single” situations involved in a structured situation, the resulting situation can also be explicitly represented. In words, *a través de la calle* denotes a relation between a street as a ground, and a complex or structured (external, orthogonal) position defined with respect to this ground.

²⁶ This flexibility of interpretation is amply discussed in the TL literature (Jäger 2005: ch.5; and references therein). For this reason, I do not explore these theoretical matters in any proper detail. Note, though, that I gloss “axial” terms such as *debajo*, *encima* and several others as e.g. the vertical or horizontal region of a ground, i.e. as implicitly relational terms. See Svenonius (2006) for related discussion on this matter.

We can now show that, with some very minor changes, our approach can easily derive the interpretation of complex SSPs such as *a la izquierda de la bicicleta* (cf. (56)). The fact that these SSPs appear to include “extraneous” DP elements, at a superficial glance, is not a concern for our semantics. I show this point in (70):

- (70) $t.$ $[[a]] = at_{\langle s \rangle}$ (Interpretation)
 $t+1.$ $[(P)] = \lambda x. \lambda y. s: (x \leq y)_{\langle s \langle s, s \rangle \rangle}$ (Interpretation)
 $t+2.$ $([[a]])/[[(P)]]$ $= (at)\lambda x. \lambda y. s: (x \leq y) = \lambda y. s: (at \leq y)_{\langle s, s \rangle}$
 (Function Application)
 $t+3.$ $[[la izquierda]] = lf_{\langle s \rangle}$ (Interpretation)
 $t+4.$ $[[a (P)]]/([[la izquierda]])$ $= \lambda y. s: (at \leq y)(lf) = s: (at \leq lf)_{\langle s \rangle}$
 (Function Appl.)
 $t+5.$ $[[de]] = \lambda x. \lambda y. s': (x \leq y)_{\langle s \langle s, s \rangle \rangle}$ (Interpretation)
 $t+6.$ $([[a la izquierda]])/[[de]] = (s: (at \leq lf))\lambda x. \lambda y. s': (x \leq y) =$
 $= \lambda y. s': (s: (at \leq lf) \leq y)_{\langle s, s \rangle}$
 (Function Application)
 $t+7.$ $[[la bicicleta]] = bc_{\langle s \rangle}$ (Interpretation)
 $t+8.$ $[[a la izquierda de]]/([[la bicicleta]])$ $= \lambda y. s': ((s: (at \leq lf) \leq y))(bc) =$
 $= s': ((s: (at \leq lf) \leq bc))_{\langle s \rangle}$
 (Function Application)

The derivation in (71) shows that, at our slightly coarse-grained level of semantic analysis, the interpretation of these particular complex SSPs is straightforward, and parallels that of their determiner-less counterparts. This result suggests that once we do not hinge on the morpho-syntactic differences among types of SSPs and focus on their abstract properties, we can easily generalise our account. Apparent recalcitrant cases do not pose a problem, with the opportune assumptions.

I now turn our attention to Boolean SSPs, and address their semantics in some detail. In our approach, disjunction *o* ‘or’ and conjunction *e* ‘and’ can be interpreted as mereological sum and product, as we reason with partially structured situations. This means that *junto y delante de la casa*, from example (50j), receives the partial interpretation offered in (71):

- (71) $t.$ $[[junto]] = jn_{\langle s \rangle}$ (Interpretation)
 $t+1.$ $[y] = \lambda x. \lambda y. s: (x \cap y)_{\langle s \langle s, s \rangle \rangle}$ (Interpretation)
 $t+2.$ $[[junto]]/([[y]])$ $= (jn)\lambda x. \lambda y. s: (x \cap y) = \lambda y. s: (jn \cap y)_{\langle s, s \rangle}$
 (Function A.)
 $t+3.$ $[[delante]] = dl_{\langle s \rangle}$ (Interpretation)
 $t+4.$ $[[junto y]]/([[delante]])$ $= \lambda y. s: (jn \cap y)(dl) = s: (jn \cap dl)_{\langle s \rangle}$
 (Function A.)
 $t+5.$ $[[de]] = \lambda x. \lambda y. s': (x \leq y)_{\langle s \langle s, s \rangle \rangle}$ (Interpretation)
 $t+6.$ $([[junto y delante]])/[[de]] = (s: (jn \cap dl)) \lambda x. \lambda y. s': (x \leq y) =$
 $= \lambda y. s': (s: (jn \cap dl) \leq y)_{\langle s, s \rangle}$
 (Function Application)
 $t+7.$ $[[la casa]] = cs_{\langle s \rangle}$ (Interpretation)
 $t+8.$ $[[junto y delante de]]/([[la casa]])$ $= \lambda y. s': (s: (jn \cap dl) \leq y)(cs) =$
 $= s': ((s: (jn \cap dl) \leq cs))_{\langle s \rangle}$
 (Function Application)

This derivation should be straightforward to read. In words, *junto y delante de la casa* denotes the intersection of two regions, the adjacent and the frontal regions of the room, which form a more specific region in which the figure can be located. Since *y* has a Boolean interpretation, it captures the position that the figure is in either region, but also that it can be in a region which is the mereological intersection of these two regions (i.e. the frontal *and* adjacent one). One obvious consequence of this approach is that Boolean SSPs can be interpreted much like other Boolean categories, e.g. DPs (Winter 2001: ch.1). So, they can give rise to complex types of spatial meanings. Since there is no precise limit to which SSPs can be combined together via Boolean connectives, we can therefore conclude that the range of possible spatial meanings may be limitless, too. If a limit exists, then it could be based on *lexicalisation* principles, i.e. on how complex the meaning of single lexical items can be (Levinson & Meira 2003 for a cross-linguistic discussion)²⁷.

3.4.2. The Data, Semantics: Discourse-oriented phenomena, and Verb Distribution

We turn our attention to our set of semantic problems in need of a solution: argument demotion, *dónde*-questions and the distribution of SSPs with Verbs. I start from the argument demotion examples, by first discussing those SSPs such as *debajo*, which in our analysis display a morphological structure that is sensible to syntactic operations. Recall from (58) that *debajo* in *debajo de la mesa* ‘below the table’ can be decomposed into two morphemes, *de-* and *-bajo*, respectively a *p/p-* and a *p*-unit. Look at (72):

- (72) t . $[[\text{de-}]]=\lambda x..s:(x)_{\langle s,s \rangle}$ (Interpretation)
 $t+1$. $[\text{-bajo}]]=d_{\langle s \rangle}$ (Interpretation)
 $t+2$. $[[\text{de-}]]/([[\text{-bajo}]])=\lambda x..s:(x)(d)=s:(d)_{\langle s \rangle}$ (Function Application)
 $t+3$. $[\text{de}]]=\lambda x.\lambda y.s:(x \leq y)_{\langle s \langle s,s \rangle \rangle}$ (Interpretation)
 $t+4$. $[[\text{debajo}]]/([[\text{de}]])=s:(d)\lambda x.\lambda y.s':(x \leq y)=\lambda y.s':(s:(d) \leq y)_{\langle s,s \rangle}$ (F.A.)
 $t+5$. $[[\text{la mesa}]]=m_{\langle s \rangle}$ (Interpretation)
 $t+6$. $[\text{debajo de}]]/([[\text{la mesa}]])=\lambda y.s':(s:(d) \leq y)(m)=s':(s:(d) \leq m)$ (F.A.)

One key aspect of this derivation is the interpretation of *debajo* via its constituting morphemes, *de-* and *-bajo*. I assume that *bajo* denotes a vertical position, on the “negative” axis of a given ground, and that *de-* acts as a functional (i.e. 1-place) version of its relational counterpart. Their compositional interpretation amounts, to an extent, to explicitly marking the situation as a structured, spatial situation, and not much else. When *de* merges with the *debajo*, this vertical position is defined with respect to the table, straightforwardly enough.

With this analysis at our disposal, we can also account the data that involve the SSPs which must occur without ground DP, such as *abajo*. As discussed by Fábregas (2007) and in section 2.2., these SSPs have counterparts which usually occur with a ground DP, hence with the relational morpheme *de*. For *alante*, *delante de* is the

²⁷ If one pushes the analogy further, then one can observe that there seems to be a connection between the possibility of “indexing” each Boolean Phrase with a lexicalised term (e.g. *to the left and to the right* being very roughly equivalent to *between*). This is a possibility that emerges from our use of the Curry-Howard isomorphism which, I understand, has been discussed in different terms in the literature (e.g. Keenan & Faltz 1985; von Stechow 1995; a.o.). Again, I leave far-reaching speculations aside.

relevant counterpart SSP. From a morphological point of view, these two SSPs differ in the prefix they combine with, *a-* and *de-* respectively. From a syntactic and semantic point of view, the SSPs forming the *a-* series block the realisation of ground DPs, which must be recovered from previous context (explicit or implicit). One simple way to capture this fact is to consider that *a* can explicitly capture its lexical relation with *de*, as a relation between the more specific structured situation *at*, and the more general situation *s*. I capture this lexical relation as “*s':at≤s*”, and offer the following derivation based on (38), to show how this simple assumption accounts for the blocking phenomena:

- (73) $t.$ $[[a-]] = \lambda x..at \leq s:(x)_{\langle s,s \rangle}$ (Interpretation)
 $t+1.$ $[-lante] = al_{\langle s \rangle}$ (Interpretation)
 $t+2.$ $[[a-]] / ([[-lante]]) = \lambda x.at \leq s:(x) = at \leq s:(al)_{\langle s \rangle}$
 (Function Application)
 $t+3.$ $[de] = \lambda x.\lambda y.s:(x \leq y)_{\langle s \langle s,s \rangle \rangle}$ (Interpretation)
 $t+4.$ $([alante]) / [de] = (at \leq s:(al)) \lambda x.\lambda y.s:(x \leq y) =$
 $\lambda y.s:((at \leq s:(al)) \leq y) = *$ (Inconsistent Interpretation)

The intuition behind (73) is simple. The derivation states the identity between the structured situation *s*, the “whole” relation denoted by *alante* (represented in step *t+2*), and one specific part of this relation (denoted by *a*). This occurs as soon as *de* is merged with *alante*, and triggers an inconsistent interpretation, an interpretation that cannot find any values in the model. The formal reason is simple. Recall, once more, that the notation $s:(x \leq y)$ stands for the identity between a situation *s* and its corresponding parts (i.e. $s = \{x, \{x, y\}\}$). In our case, we would have the contradictory identity $s = s'$ to emerge: a whole is identical to its relevant part under discussion. This contradiction renders the phrase and its related sentence un-interpretable, since there is no possible situation in the Model of Discourse that can have these formal properties. .

Hence, we correctly account that *alante* must trigger argument demotion, as the data show, by simply observing that *alante* and the *a-* series of SSPs have an interpretation that resembles that of indexicals such as *there*, in dynamic frameworks such as DRT (Zeevat 1999; a.o.)²⁸. As also observed in the literature on nominal anaphora, if the result of merging certain lexical items makes impossible to distinguish referents in discourse, then a sentence must be ruled out (Elbourne 2005; Reuland 2011; a.o.). Our data support this proposal as holding for the domain of spatial situations (and SSPs), too. I think that, since this seems a general principle of Grammar, the fact that we find it at work in the domain of SSPs supports the validity of our approach²⁹.

I make a technical observation before moving onto the next topic, that of *dónde*-questions. Our approach to “morphological” interpretation is consistent with current proposals that view morphemes as the building blocks of the compositional process (Szabolczi 2010: ch.10; Harley 2012; a.o.). This is not surprising, if we consider that these approaches are close to, or even embedded within Distributive Morphology, which also directly connect semantic interpretation to morpho-syntactic structure. So,

²⁸ I also note that our proposal converges with the analysis of event/temporal (anaphoric) relations in Discourse Representation Theory (Kamp and Reyle 1993; Kamp van Genabith and Reyle 2005; a.o.). The careful reader will certainly have noticed that our Semantics in part resembles that of DRT, although a more thorough analysis of these parallels must wait for future research.

²⁹ The proposal in Elbourne (2005) is cast in a variant of Situation Semantics not unlike ours, and offers an account of the so-called “bishop sentences” that rules out ungrammatical sentences in a similar way. Furthermore, with some work our proposal would in theory be easily implemented in DRT, if we consider identity statements as denoting anaphoric relations. A more accurate discussion of these parallels is beyond the scope of this paper, however.

I think that our proposal lends further support to a direct compositionality approach, although our support comes from the interpretation of SSPs, rather than DPs.

We now turn our attention to *dónde*-questions and their semantics. I do not pretend to offer a thorough analysis of this phenomenon, for it would take us too far afield. I note, however, that via our (partial) adoption of Veermat (2003) analysis, I can also adopt a simplified version of Krifka (2001), known as the structured meanings approach to questions. The simple intuition behind this approach is that questions denote the set of its possible and appropriate answers. In Krifka (2001) these answers are modelled as propositions (i.e. sets of possible worlds), complete with their own internal structure. Our structured situations are the ontological equivalent of propositions, insofar as we consider situations as (partial) possible worlds, as in some dialects of situation semantics (Barwise & Etchemendy 1990; Kratzer 2007; a.o.). So, we can adopt this analysis with some minimal changes, which are shown in (74), which in turn offers a (simplified) semantic analysis of (61):

- (74) $t+k.$ Q: $[[\text{Dónde va Mario? }]]=\lambda y.s':go:(m \leq loc(y))_{\langle s,s \rangle}$
 $t+k+1.$ A: $\{s:(sb \leq m)_{\langle s \rangle}, s:(e)_{\langle s \rangle}, s:at:(jn \leq c)_{\langle s \rangle}, s:en:(pr \leq ls)_{\langle s \rangle},$
 $s':((s:(a \leq tr) \leq ca))_{\langle s \rangle}, s':((s:(jn \cap dl)) \leq cs)_{\langle s \rangle}, *at \leq s:(al)_{\langle s,s \rangle}\}$

The set of structured situations in (74) offers a glance of the possible answers that make up the meaning of *dónde va Mario*, here represented as a simplified λ -term. In words, our *dónde*-question denotes a function which individuates a set of locations in which Mario can be located, represented as the meanings of SSP Phrases we derived in this section. Since our semantic analysis offers a straightforward account of SSP Phrases as structured situations, it should come as no surprise that we can directly implement a compositional semantics of *dónde*-questions and answers. Before discussing in detail the empirical merits of our approach, though, we tackle our final semantic problem, that of the distribution of SSPs with Verbs.

The semantics of SSPs I have sketched here is fully compositional, but it mostly focuses on how situations are computed together into structured situations. One aspect of SSPs' meanings that our semantics does not represent is the standard distinction between directional and locative types of SSP (Jackendoff 1983, 1990; Wunderlich 1991; Zwarts 2005; a.o.). Our compositional account assigns a fine-grained analysis of the structured situations that SSPs denote, but does explicitly capture whether each item is directional or locative, in meaning. However, recall from our examples in (1)-(42) that all SSPs can combine the Copula *estar* 'to be', and the Verb of motion *ir* 'go'. Since the key diagnostic to identify directional SSPs is that such SSPs cannot combine with the Copula, we seem not to have evidence of their existence in Spanish.

I observe, however, that the Merge of Verb and SSP does have a specific reading, which therefore is the result of the corresponding interpretive process. So, a more accurate representation of this "layer" of meaning can include a form of semantic (lexical) *underspecification*, a phenomenon amply discussed in the literature (Reyle 1993; Poesio 2001; Harbour 2007; Egg 2011; Reuland 2011: ch.5; Ursini 2013b; a.o.). Pre-theoretically, if we assume that SSPs can be represented as having either possible reading, then their Merge with a non-ambiguous Verb has the effect of selecting only one reading. This reading is thus determined by the Verb, which disambiguates the interpretation at a sentence level (Gehrke 2008; Real Puigdollers 2010; see Fong 1997; Zwarts 2005; for a "symmetrical" view).

Again, I do not pursue a full formal approach of underspecification, for it would lead us too far afield. The intuition that I wish to formalise, however, is simple: SSPs

can be represented as being underspecified with respect to the directional/locative divide. If we assume that this distinction is represented via the feature D (for “directional”), then SSPs can have both values for this feature represented in their interpretation. So, an SSP Phrase such as *a la sala* denotes a structured situation $s:(at)_{\langle s \rangle}$, which we enrich via the feature $\pm D(s:(at))_{\langle s \rangle}$. In words, this SSP can either be interpreted as denoting a directional-like interpretation, or a non-directional one. Since this lexical form of underspecification is limited to two values, we can represent an underspecified SSP as the set union of the values. This is shown in (75) (cf. Poesio 2001: ch.4, Harbour 2007; Ursini 2013b):

$$(75) U = \{+D(s):(at)_{\langle s \rangle}, -D(s):(at)_{\langle s \rangle}\}$$

In words, an underspecified interpretation set U for an SSP Phrase such as *a la sala* involves the set-theoretic union of its two possible values, directional ($+D$) or non-directional/locative ($-D$). When a specified Verb (e.g. a Verb marked as being $+D$) merges with an underspecified SSP, two possible interpretations are derived, but only one yields a non-null result, the one that “agrees” in features. I show how these interpretations are computed in (76), which offers a coarse grained derivation of (14):

$$(76) t+k.[[\text{Mario va}]]/([\text{a la sala}]]=\lambda y.s:+D(\text{go}):(m \leq y)(\{+D(s):(at), D(s):(at)\})= \\ \{s:+D(\text{go}):(m \leq +D(s):(at)), s:+D(\text{go}):(m \leq -D(s):(at))\}= \\ \{s:+D(\text{go}):(m \leq (s):(at)), \emptyset\}$$

In words, the derivation in (76) reads as follows. The meaning of the underspecified SSP is computed point-wise, i.e. the Verb merges with each of the possible interpretations and yields two distinct interpretations. One of these interpretations is vacuous, since it amounts to the composition of two opposite values which, in our full Algebra model, coincides with the empty set “ \emptyset ”. A more accurate formal treatment of these data would take too much space, although it could be captured within our theoretical approach³⁰. The intuition that SSPs depend on Verbs, for their directional/locative interpretation should be clear enough, however.

So, we predict that SSPs depend on Verbs for this aspect of their interpretation, as the derivation in (76) suggests. Under more restrictive assumptions about the meaning of SSPs, these data would not be easily accounted for, as each SSP would receive a single value (e.g. directional). If a Verb has the opposite value, then there would a feature disagreement that would render the sentence un-interpretable, contrary to facts. In our approach, we can actually *predict* that a Verb determines the value for the directional/locative layer of meaning, as per observation. Therefore, I think that three observations about this datum are in order, before we move to the discussion part. The observations are as follows.

First, our approach to the semantic interplay between Verbs and SSPs is consistent with proposals such as Matellan & Mateu (2010), which offer an “constructivist” analysis based on HK. Intuitively, this proposal suggests that SSPs and Verbs can denote different types of events structures, projected from their lexical syntax (which we discussed in section 3.1.). The emergence of either “spatial” reading is the result

³⁰ Within Minimalism, one proposal that could offer a simple account in terms of features and the *Agree* relation is Camacho (2012), which focuses on the copulae *ser* and *estar* and their relation with complement Ps. A situation semantics approach that offers an Agree-based approach, although with different but related syntactic assumptions, can be found in Ursini (2011, 2013a). I defer for future research an implementation of this proposal with our work, however.

of how SSP and Verb combine together, since their syntactic mode of composition determines event (semantic) structure as well. Our proposal follows a quite similar tack, if only it differs in the actual mode of implementation.

Second, our approach does not necessarily rule out that certain complex SSPs, such as *hacia a* ‘until to’, roughly, can have an inherently directional meaning (cf. Demonte 2011: §3). I think that certain *compositional* combinations can favour one reading over another, because of their inherent lexical content. For instance, I understand that *hacia* can denote either a (dynamic) direction of a moving entity or an orientation of a still object, although the first reading is preferred. We also know that *a* can either correspond to English ‘at’ or ‘to’, something expected in our theory. So, nothing excludes that a compositional, directional meaning emerges as the most likely, if not unique interpretation of *hacia a*. The key aspect is that in our approach such a result must not be explicitly represented as “position” in the Syntax, but treated as a the *result* of merging Lexical Items together, as per assumption. Therefore, I think that our approach offers a more accurate, because entirely derivational and compositional, analysis of the semantics of SSPs.

Third, I observe that the type of agreement relation that emerges between Verb and SSP can be found in the domain of Nominal Anaphors, too. The possibility that some elements are underspecified, and receive a specific interpretation via Agreement, can account subtle facts about pronouns and their distributions (Reuland 2011). I also think that finding this principle of Grammar at work within the Prepositional domain is to be expected³¹. Now that we have exhausted the analysis of all our relevant data, we can turn to a discussion on how our approach improves upon previous work.

3.5. Discussion: Our Proposal and its Rivals

The goal of this section is to evaluate how our proposal improves over previous works. For this reason, I recap the empirical results we have obtained so far. I then evaluate whether the proposals in works such as Bosque (1997) or Fábregas (2007) could be extended, to reach at least the same empirical coverage. I organise this discussion as direct a comparison between the results that we obtain, and whether these results are within the range of our direct competitors, or not. Our proposal, I think, achieves at least four important results, which extend the results obtained by our predecessors in a more thorough and theoretically transparent way.

First, our proposal offers a general approach to the syntactic structure of SSPs that seems to capture and predict the morpho-syntactic make-up of every SSP, via one unified account. Furthermore, since I am able to account the structure of Boolean SSPs, I am actually able to offer a treatment of a potentially open-ended class of elements in this category. So, I can account (and predict) a unified structure for *en*, *fuera de*, *junto a*, *por entre*, *enfrente de*, *a la izquierda de*, *enfrente y delante de*. The apparent differences are based on the “amount” of structure they instantiate, rather than the type of structure they should project. In this respect, our proposal seems particularly successful, as offers the unified structural approach I aimed for.

Second, our proposal can also cover morphological phenomena and discourse-bound phenomena that are visible to syntactic derivations, as well as the interaction of these phenomena. Since our proposal can account the structural properties of SSPs such as *de-bajo*, *a-lante*, *ar-riba*, *en-cima* via a unified approach, it seems to easily

³¹ Similar analyses exist for the Aspectual relation between verbs and prepositions (Fong 1997; Zwarts 2005; a.o.). I leave open whether these two dimensions of meaning can be entirely conflated, as works such as Zwarts (2005) seem to suggest. If that would be the case, then I would propose that all SSPs would be aspectually ambiguous, a claim that needs thorough empirical testing.

extend to key morphological data. Informally, it seems to correctly account and predict data “below” the level of Syntax. Our proposal seems to also easily cover argument demotion data such as *Mario está en frente*, *Mario esta alante*, but also that SSP Phrases form the set of possible answers to *dónde*-questions. Informally, our proposal seems to also cover data “above” the level of Syntax. In this respect, our proposal seems particularly successful, as it appears to easily capture “interface” data in a simple and elegant way, as per *desiderata*.

Third, our approach can account the semantic interpretation of SSPs in a fully compositional way, which is also perfectly isomorphic to its syntactic structure. Hence, it offers an analysis of how the interpretation of SSPs emerges in a piece-meal fashion that is entirely regular and requires no specific assumptions to handle specific data sets. In our approach, the precise meaning of *any* SSP, including Boolean ones, is straightforwardly computed via a simple set of transparent rules, a welcome result.

Fourth, our approach can capture the subtle licensing differences between *debajo* and *abajo* and more in general argument demotion, *dónde*-questions and their interaction with Verbs. In doing so, our approach appears offer a compositional treatment of SSPs that extends above and below the word level, to the effect of offering one general “semantic engine”. Hence, the approach suggests that a simple, and generalised theory of SSPs and their interpretation may be seen as evidence in support of direct compositionality, from morphemes to Discourse. In this respect, our proposal seems to offer a powerfully general theory of the interfaces, whether they involve morphology, syntax, phonology (for demotion data), or even Discourse.

With these results in hand, we discuss whether previous proposals can be extended to achieve the same results; hence, to what extent we improve over previous analyses. For the first result, I observe that the PtP model cannot currently account Boolean SSPs without the addition of several assumptions about syntactic structure, including those on Boolean connectives. One way to ameliorate this problem would include a re-thinking of the role and nature of the two key positions that the theory proposes. Such a re-thinking, I speculate, could involve a less rigid approach to positions, and the possibility that each position has its own internal structure.

In fact, one possibility is that the cartographic approach outlined in Fábregas (2007) may offer a more accurate and generalised account of SSPs and their internal “positions”. Two aspects in favour of this approach are its implementation of a so-called γ head to denote a part-whole relation among axial terms and their grounds, and a fine-grained theory of moved constituents. However, in their strongest formulation, cartographic approaches force linear order on heads, so Boolean SSPs would still be a problem, as they involved “repeated” positions. So, an extension of Fábregas (2007) could account our Boolean SSPs data by perhaps assuming that FSEQ-like structure are iterated at a Phase level (e.g. den Dikken, 2010).

I observe that, for some SSPs, we do find a certain rigid order of positions: *a través de* is grammatical, **a través a de* is not. However, recall that *a través* involves a phonologically null head “(P)”, which in turns denotes an asymmetric part-of relation between the denotation of *a* and that of *través*. If the two Items *a* and *través* would merge in the inverse order, they would denote a cross-section region of a ground, which would also be part of the ground's external region. Since this specific relation would not denote an admissible region in the model of Discourse, the corresponding string is ruled out. In this and similar other cases, our TL fragment may appear to over-generate strings but, once its transparent interpretation is factored in, this risk seems to disappear. Once we consider that we can still easily capture Boolean SSPs, unlike rigid approaches, the advantages of adopting our fragment should be clear.

For the second result, I observe that the argument demotion data would require more accurate assumptions on the nature of demoted constituents. I think that the proposal in Fábregas (2007) could be implemented in the PtP model, even if proposes a more cumbersome syntactic account than ours (see Fábregas 2007; for discussion). Again, though, Boolean SSPs would provide a challenge, since one would need rather precise assumptions on which constituents are elided. The *dónde*-questions would also provide a challenge once we look at Boolean SSPs, for obvious reasons. So, cartographic approaches seem to run into non-trivial problems, when our data are taken in consideration.

Before we continue, I wish to offer one important *proviso* on this topic³². These problems could be obviated insofar as one takes a syn-cagorematic approach to SSPs. For instance, one can take a relatively standard approach to coordinated structures such as Williams (1990). Under this assumption, structures such as *en frente de la casa o a la izquierda de la casa* could be treated as instances of a Coordinated Phrase. Via Right Node Raising, then, one could derive the Boolean SSP *en frente o a la izquierda de la casa* (Philips 2006: 40-50; and references therein). In this case, *en frente o a izquierda* could possibly form a single constituent, via the mediation of the coordinating head. In other words, a cartographic approach that would a more sophisticated perspective on Boolean categories would possibly side-step the problems that current models seem to face. However, such an approach would indeed mark an “update” of current models. In turn, this proposal would share an analysis of categories and their linear ordering that would be closer to our proposal.

For the third result, one open question is whether either approach can be the starting point for a directly compositional analysis of SSPs. If we take that the Jackendovian approach advocated in Bosque (1997) is a possible semantic analysis for SSPs, then our data seem beyond the explanatory range of these works. Boolean SSPs cases seem a crucial case. I do not see of any obvious way to capture these data in a Conceptual Semantics approach, since logical connectives are not treated at all. However, nothing prevents that a model-theoretic account of the extended versions of our theories can be given, although it would possibly require a (quite) more complex version of the Curry-Howard isomorphism. A semantic analysis couched in a cartographic approach is in fact proposed in Morzycki (2005), but involves fairly complex assumptions about interpretation (e.g. systematic type-shifting). In our account, this approach is remarkably simple and transparent, as we can informally argue that no complex model-theoretic objects beyond relations, functions and (structured) situations are ever employed.

For the fourth result, I observe that the lack of a distinction between dynamic and static (directional and locative, in Conceptual Semantics) SSPs requires a re-thinking of the relation of these conceptual categories, along our underspecified lines. Again, note that this move is consistent with several other proposals that call for a flexible approach to the basic taxonomy of SPs (Gehrke 2008; Nikitina 2008; a.o.). In fact, our underspecified approach makes formally explicit this flexibility, and connects these data with other cross-categorial forms of underspecification. The implementation of a semantics of argument demotion and *dónde*-questions in Conceptual Semantics would also be possible, but it would require a fairly complex set of assumptions, a consequence of the need for a complex semantics. In other words, while these

³² I thank an anonymous reviewer for raising this issue, and stimulating me for being more thorough on the matter of the explanatory power of the rival proposals. Although I do know whether the reviewer would sanction my analysis, I hope that my understanding of his suggestions is on the right track, in this section.

phenomena are relatively simple to account in our approach, they would require a quite more complex analysis in this alternate extension of PtP/Cartography.

I therefore conclude that our proposal improves and can possibly extend previous proposals, provided that we consider possible extensions of these proposals as “isomorphic” to our approach. We can successfully account a wider (and possibly infinite) set of SSPs, their syntactic and semantic properties, via one unified TL fragment and its direct interpretation. We capture these conceptual relations in a rather informal way, as part-of relation over grammar models, in (77):

(77) *PtP Model* \leq *Cartography of SSPs* \leq *Our interpreted TL fragment*

The “ \leq ” relation in (77) reads as: “is a possible extension of”. So, our TL fragment should be seen as a possible extension of the PtP model, or Fábregas (2007)’s cartography of SSPs (or both). For instance, a cartographic approach that takes a flexible stance to coordination, and possibly implements a rich theory of movement (e.g. Svenonius 2007) could be equivalent to our approach, in explanatory power. Intuitively, then, our fragment offers all the necessary extensions (and “corrections”) that we require, to account our SSPs data in a unified way. So, it includes other models as sub-models that can account a part of the data, but not the full range that we discussed in this paper.

Another way to look at the logical relations among the proposals we discussed so far is as follows. To an extent, our approach can be seen as richer, derivationally more complex model of previous approach, such as the PtP model. While previous proposals would need consistent revisions to account our data, nothing prevents that these extensions would not reach our results, too. However, even in such a case, our proposal seems to have an advantage on grounds of economy and “temporal precedence”. First, our proposal seems to require fewer theoretical assumptions (economy). Second, our proposal seems to “already” offer an account of SSPs, while other proposals seem to require further implementations (temporal precedence). With these final conclusions in our hands, we can now move to the conclusions.

4. Conclusions

In this paper I have offered a novel analysis of Spanish Spatial Prepositions, or SSPs. This analysis solves the three problems that I outlined in the introduction, for the following reasons. The proposal offers a more thorough analysis of their syntactic properties (first problem), their semantic properties (second problem), and offers an extension to previous works on this topic (third problem). I have achieved this welcome result by following these steps.

First, I have discussed previously known data, and broadened our coverage of SSPs. I have discussed data that are seldom, if never mentioned in the literature, and shown that these data challenge previous analyses in non-trivial ways. In this way, I have set up the range of desiderata that our proposal had to explain, in order to be successful. I have shown that we could propose a unified approach to the structure of SSPs such as *en*, *en frente de*. I have then shown that our unified approach can also analyse argument demotion data (e.g. *en frente (de la sala)*), but also the *alante/delante* alternation. Since our approach can also offer a simple analysis of *dónde*-questions, we can conclude that we have successfully solved the problem of giving a uniform Syntax of SSPs.

Second, I have shown that once we have an accurate syntactic analysis of SSPs, then a compositional treatment of their semantics follows straightforwardly. All we

need to assume is that the semantic transparently represents the interpretation of single constituents (e.g. *en*, *frente* and *de* in *en frente de*). Once we also have a transparent analysis of how these constituents are combined together into Phrases, we also automatically have an analysis of their compositional interpretation (i.e. the meaning of *en frente de*). I have then shown that the semantics of argument demotion, *dónde*-question data follows straightforwardly. I have then shown that the well-known ability of SSPs to combine with both static and dynamic Verbs (e.g. *estar* and *ir*) follows straightforwardly from our treatment. Therefore, I conclude that we have successfully solved the problem of offering a semantics of SSPs.

Third, I have shown that our proposal improves over previous works (PtP model, Fábregas 2007), since it can account a wider set of data under a single, unified approach. From a theoretical standpoint, I think that this result is possible because I offered a more accurate and general analysis of the structure of SSPs (section 2). Thanks to this analysis, I have been able to define a TL fragment analysis (sections 3.1, 3.2.), and its interpretation (sections 3.3.) that correctly accounts and predict the data. Therefore, I conclude that we have successfully solved the problem of defining a more accurate model of SSPs that improves over previous proposals. While these proposals can be enriched, in order to account these data, our proposal seems to do so “before” other proposals, and with fewer assumptions.

Overall, I conclude that I have successfully offered a novel theory of SSPs, which can successfully account and predict the data I discussed in this paper. I also observe, however, that there are several problems that I do not address in detail. For instance, I did not discuss the complex topic of spatial P prefixes on Verbs, closely related to our data. Although I discuss certain aspects of prefixation via our analysis of the *a*- and *de*- series, I leave open the possibility that such analysis extends to all relevant cases (see Fábregas 2010). As those data go beyond the topic of SSPs, I leave them aside for future research.

I also leave aside the possibility that our fragment can also account other “movement” phenomena, such as passivization or locative inversion (see den Dikken 2006). Since those data also involve processes that go beyond an analysis of SSPs, I leave them aside, too. Furthermore, I leave open the question on how our situation semantics approach compares to other approaches to the semantics of SSPs (Nam 1995; Zwarts & Winter 2000; a.o.). In particular, I leave aside a discussion of those approaches that aim to propose a compositional semantics of SPs (Kracht 2008; Svenonius 2008; a.o.). As these approaches involve syntactic analyses of English SPs, and involve sets of data that are quite different from ours, I leave them aside, too.

I also do not discuss in any relevant detail the subtle interaction between SSPs and Verbs on the level of Lexical Aspect, a topic that has received considerable attention in recent literature (Zwarts 2005). Although this appears to be a relatively understudied aspect of SSPs, it requires a more thorough discussion of the interaction between Verbs and SSPs (Aske 1989; Demonte 2011; Brucart 2012; a.o.). Ideally, a unified proposal can be offered via the situation semantics-based approach I offer in this paper, and that I apply to Spanish auxiliary verbs (Ursini 2011, 2013a). However, I leave this topic aside, too, for future research, together on a more thorough study on the lexical properties of SSPs. One example pertains to the differences in meaning between *en* and *a*, but several others could be discussed. Several other topics could be mentioned, but I think that a more thorough discussion of these and other topics must wait for a future occasion.

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