

An Interface Approach to Binding: Spelling Out referential expressions as a function of syntactic-semantic construal

Diego Gabriel Krivochen

University of Reading, CINN

e-mail: d.g.krivochen@pgr.reading.ac.uk

Abstract:

In this paper we will critically revisit generative Binding Theory, one of the foundational stones of the GB model, and a stronghold of orthodox approaches to semantics and Logical Form within the Minimalist Program. The theory assumes a typology of referential expressions, based on distributional constraints given by two properties, *anaphoric* and *pronominal*. In this work, we will conceive a maximally simplified lexicon containing only lexical *type*-variables -instantiated as *tokens* in a particular derivation- and procedural elements, and attempt to: (a) derive distributional constraints over referential expressions, including verbs (eventive entities) and nouns (sortal entities), from more basic principles of grammar, and (b) derive the materialization (Spell-Out) of variables corresponding to those types of entities from local relations between *tokens* of lexical variables in a syntactic-semantic construal, and functional-procedural nodes. Our objective is to question the consideration of the typology of referential entities in Mainstream Generative Grammar¹ (MGG) as primitives of Binding Theory, as part of an eliminative program for linguistic theory.

Keywords: *Binding; Reference; Locality; Interfaces; Spell-Out*

1. Introduction: on the typology of referential expressions:

The generative tradition started by the Lectures on Government and Binding (Chomsky, 1981) classified referential expressions of nominal nature according to their binding properties, that is, the relation with an antecedent that gives those expressions reference and, in some cases, that also agrees with the relevant nominal. Two diacritic features were in charge of determining the possible distribution of an NP:

- 1) [+/- anaphoric]
 [+/- pronominal]

¹ Following Culicover and Jackendoff (2005: 3), we will use the term MGG all throughout the present work 'to refer to the line of research most closely associated with Noam Chomsky, including *Syntactic Structures* (1957), *the Standard Theory* (*Aspects of the Theory of Syntax*, 1965), *the Extended Standard Theory* (*Studies on Semantics in Generative Grammar*, 1972), *the Revised Extended Standard Theory* (*Reflections on Language*, 1975), *Principles and Parameters Theory* (*Lectures on Government and Binding*, 1981), and *the Minimalist Program* (1993; 1995)', as well as those extensions and patches by authors closely related to Chomsky's theoretical position, and whom Chomsky or collaborators have recognized as part of their enterprise. If unsatisfied by this label, the reader is free to substitute it with his own favourite.

While the exact nature and ontology of these features was not clear (perhaps given by UG?), they predicted the existence of four types of expressions, which became eight if a further distinction [+/- overt] was taken into account:

[a]	[p]	Symbol	Name of empty category	Corresponding overt noun type
-	-	<i>t</i>	Wh-trace	R-expression
-	+	<i>pro</i>	“little Pro”	Pronoun
+	-	<i>t</i>	NP-trace	Anaphor
+	+	PRO	“big Pro”	<i>None</i>

Table 1: Inventory of referential expressions

This featural characterization translates in the following distributional constraints:

- 2) a. Wh-traces and *pro* are never correferential with a c-commanding element within a local domain D
- b. NP-traces and PRO can be correferential with a c-commanding element within a local domain D

Traditionally, D = NP / CP (or S'), the so-called “bounding nodes”. These nodes have the particularity of being able to host not only the trace but also a potential governor and an accessible “subject” (that is, an element from which to take reference and morphological agreement) for the bound element, and are called “governing categories”. The module of the mental grammar in charge of determining well-formedness conditions for reference relations was Binding Theory, comprising three (allegedly, UG) Principles (Chomsky, 1981; see Kosta, 1992 for extensive discussion and development):

- 3) Principle A: an anaphor is always bound in its governing category
- Principle B: a pronoun is always free in its governing category
- Principle C: a referential expression (R-expression) is always free

Principle A rules the distribution of elements like [him/herself] and [each other], reflexives and reciprocals. Principle B rules the distribution of pronouns like [him/her]. Principle C rules the distribution of proper names and full DPs (i.e., Determiner+NP), referred to as R-expressions (in a very narrow sense of “referential”, needless to say), each principle applying at different syntactic levels of representation which are not clear to this day (see, e.g., Lebeaux, 2009, and his proposal for Principle C applying all throughout the derivation; or Chomsky, 1981: 196-197, who proposes that the same principle applies at S-Structure, all others applying at Logical Form LF; cf. Barss, 1986, who proposes that Principle A applies at S-Structure and not at LF). These distributional constraints give rise to interesting phenomena, like crossover effects (a Wh- element binding a trace over a proper name or a pronoun) or binding in parasitic gaps and Across-The-Board movement. In any event, the distributional properties of a lexical element are fixed from the Lexicon LEX, and enter the derivation already fixed in the form of featural specifications. This means that the three

kinds of aforementioned elements are primitives of the theory, which has proven problematic when cross-linguistic empirical data is taken into account: languages like Latin allow elements like [se] to be bound locally, like regular anaphors, or at a long distance, outside its governing category and hopping over the closest potential binder in strictly structural terms (we will analyze such an example below). Culicover & Jackendoff (2005: Chapter 10) point out that sometimes, an anaphor might be free (2005: 359, ff.), or an R-expression can be bound, as in (4) and (5) respectively (4 = Culicover & Jackendoff's (9)):

- 4) [Context: Mme. Tussaud's museum, walking with Ringo Starr and stumbling upon the Beatles' statues] ...All of a sudden, [Ringo]_i started undressing [himself]_{i,j}.

[himself] can refer either endophorically (the real Ringo, index *i*) or exophorically (to the statue, index *j*), given a particular phenomenological, extra-linguistic, context. The apparent violation of Principle C in (5) below, an example in which the R-expression embedded in a DP is bound by a higher pronoun, is also acceptable in an appropriate context, both processes being productive and thus need to be accounted for:

- 5) [same context] [His]_i pointing at [the statue of [Ringo]_i] is cute

From a different stance, both conceptual and empirical problems of Canonical Binding Theory CBT (focusing on Principles A and B) are pointed out by Lasnik (1997), from an incipient Minimalist stance. His conceptual objections are the following (1997: 238-239):

- Principle A: is superfluous, insofar as it can be subsumed to a more general principle of grammar, according to which “*in a local domain, dependent elements and their antecedents may share any property necessary*”.
- Principle B: problematic from the point of view of its formulation. Negative principles are unusual.

It is to be noticed that the negative operator in some formulations of Principle B is, in our opinion, accidental: we could say that “*a pronoun must be bound outside its governing category*”, and that would be it. However, since MGG does not take into account inter-sentential relations, or the relation between a proposition and the phenomenological world (essential to account for indexicals), Lasnik's objection holds². Pronouns do not lack a binder (the condition that a pronoun must be “free” within its governing category, i.e., that an antecedent must be *absent*), it is just the case that the binder is either in a different domain *or* outside the sentence containing the pronominal, as in the case of indexicals or other *exophoric* elements, including Tense operators as we will see below.

Empirically, interlinguistic variation (including overlap of morphological pronouns and anaphors, and the distribution of short-long reflexives of the kind *zich-zichzelf* (Dutch) *sí/se-sí*

² Truth to be told, recent locality conditions involving impenetrability make extensive use of negative conditions, such that “the complement of a phase head is impenetrable to [i.e., cannot be targeted by] outside probes” (the Phase Impenetrability Condition of Chomsky, 2000, 2001), which gives rise to ambiguities. Lasnik's objection applies not only to CBT, but, we think, as a general meta-theoretical desideratum.

mismo (Spanish)) posits serious problems to CBT, if approached from the morphological form to the syntactic configuration³. The overlap can be seen in examples like the following:

- 6) Jan_i zag een slang naast zich/hem_{i/j} (Dutch)
John saw a snake near self/him

In a configuration like (6), English allows only a pronoun, whereas Dutch presents a (morphological) choice between anaphor and pronoun. German, on the other hand, presents only one morphological option, the anaphor:

- 7) Johann sah eine Schlange neben sich/ihm_{*i/j} (German)
John saw a snake near self/him

The apparent universality of CBT, given by the status of its constraints as “Principles” of UG is challenged by interlinguistic evidence, in which morphological exponents for pronouns and anaphors can be in complementary distribution in the same syntactic contexts. At this respect, a point we want to make in this paper (and will develop below) is that, informally put, nothing is what it seems: more technically, morphology and semantics are not biunivocally mapped, so that a morphological anaphor can behave as a semantic pronoun, and *vice versa*, a fact that will be clear in our analysis of Latin long distance anaphors. The notions of morphological underspecification and impoverishment, which are central to DM theories, could be appealed to in a development of a comparative perspective on BT. Such a development is of course out of the scope of this paper, even though we will introduce a new perspective on BT by means of the convergence of generative syntax and Relevance theory as an attempt to provide prolegomena to a model of the syntax-semantics interface.

Also Reuland (2011) –although from a more orthodox stance- points out that CBT is not enough to explain the behavior of pronominal or anaphoric elements, even in English. Thus, he discusses a feature-determined syntactic thesis, as a possible solution to, for instance, the distribution of simple and complex anaphors (e.g., Dutch *zich* / *zichzelf*, see Rooryck & Wyngaerd, 2011: Chapter 6 for details), which does not overlap. Reuland’s proposal is based on the concept of phi-feature, a label that includes, for MGG, *person* and *number*. His main thesis is what he calls *Feature Determinacy Thesis* (Reuland, 2011: 22):

Syntactic binding of pronominal elements (including anaphors) in a particular environment is determined by their morpho syntactic features and the way these enter into the syntactic operations available in that environment.

³ As a reviewer pointed out, the problem of long distance anaphors and logophors has been dealt with from various perspectives, both transformational and non-transformational (e.g., Keenan, 1988; Pollard & Sag, 1992, respectively –to name but two-). It is also true that some generativists agree in that discourse perspectives *should* be included within BT (e.g., Reinhart, 2006), but they are clearly not presenting a version of CBT, but a whole alternative framework altogether, just like us (for discourse is not considered within the narrow Y-model that still serves as the basis of Minimalist theorizing; see e.g. Hornstein and Idsardi, 2014). Moreover, the interplay between generative syntax and Relevance theory within a Multiple Spell-Out model is, to the best of our knowledge, exclusive to the present approach. Whether the reader considers the interplay of theories an advantage or a disadvantage is a separate matter, but the result is logically consistent.

Notice that no mention is made to semantic specifications and the relation between referential elements and the phenomenological world (essential to account for 4 and 5, if indexes are to be eliminated) consequently, Reuland's theory is not, in our opinion, entirely accurate. Besides, it draws heavily on the concept of feature, and Agree⁴, insofar as the latter is the operation that relates feature values and also, according to Boeckx (2010), constraints the generative operation Merge so that only Agree-compatible configurations are formed. With respect to Reuland's proposal in more specific terms, even though we sympathize *a priori* with a "context-determined" approach (a "particular [syntactic] environment"), we echo Culicover & Jackendoff's criticism to purely syntactic solutions to binding problems: including QR, there is always an operation of deletion required if there is more than one copy of an element within a syntactic object (both under a copy or a trace theory of displacement). Reuland (2011: 32) assumes copy theory, and thus the objection applies. Consider, for example, his derivation of (8) along the lines of (9):

- 8) Himself, John admires
- 9) Himself, John admires ~~himself~~

c-command requirements on BT force a base-generation of *himself* as Compl-V. The deletion operation, forced by Spell-Out requirements (say, related to Kayne's 1994 LCA and the impossibility of linearizing symmetry points in which syntactic objects mutually c-command), in turn, forces a polystratified approach to syntactic derivations: there is a phrase marker in which we have two objects, and a second one, derivationally posterior (after the application of a deletion operation), in which we have one. Culicover & Jackendoff (2005: 366) point out that deletion is semantics-sensitive, particularly regarding *statue-like* readings (see 4), in which there is a metonymic relation between the elements involved in the referential dependency (in the relevant case, Ringo and his statue).

Despite the criticism above, it is to be noticed that some features of CBT are indeed surprisingly stable cross-linguistically (for instance, clear-cut strong cross-over effects)⁵. However, the fact that linguistic phenomena do not involve a single level of analysis (that is, not just syntax, or phonology, or semantics) is frequently overlooked, particularly favoring the syntactic component⁶. For instance, Chomsky (1976: 324) claimed that the kind of rule that filters out

⁴ Lasnik's (1997: 242, ff.) theory is similar to Reuland's at this respect: he proposes that Case plays a central role in the determination of anaphoric forms. However, considering that MGG considers Case to be the result of operations over features (checking, valuation...), and not simple configurational relations with no added elements in the representation (as in DeLancey's 2001 functionally-based proposal), we will not consider the proposal as an "alternative" insofar as it is inscribed within the core of MGG's machinery.

⁵ This does not mean that stable cross linguistic behavior is to be interpreted as a proof for CBT: such a proof, particularly taking into account that CBT is based on Principles given by UG, would need additional argumentation about no other possibility being logically consistent or empirically adequate. To our knowledge, no such proof has been devised.

⁶ Bennis, Pica and Rooryck (1997: ii), in a related perspective, claim that "*the theory [of language] has to be embedded in a broader semiotic theory which makes use of the grammatical information to determine the 'meaning' and 'reference' of expressions*". Binding theory, of course, falls within their concern. While we will not pursue a semiotic theory, the integrationist approach is shared between both perspectives.

crossover instances belongs to discourse, not to sentence grammar. In a more recent perspective, Heine and Miyashita (2008: 172, ff.) claim that:

“reflexivity and reciprocity are universal concepts in so far as all languages can be expected to have some grammaticalized expression for both.”

However, they also concede that exceptions are common within pidgins and creoles, and Reuland (2011: 23) adds Malayo-Polynesian languages. In our terms (always positioned at the syntax-semantics interface), as *semantic* concepts, reflexivity and reciprocity can indeed be claimed to be universal, with no variation, particularly due to their simplicity and apparently primitive character, insofar as we are aware of no successful attempt to decompose those relations onto more primitive ones. Morphophonological features (that is, the materialization of the syntactic nodes corresponding to reflexive and reciprocal arguments in a syntactic-semantic construal) vary not only cross-linguistically, but also distributionally within a language (for instance, using the same morphological element in the distribution of both an anaphor and a logophor), and “reflexive forms” can have pronominal distribution. However, that does not mean that the semantic category of reflexivity varies. As Culicover & Jackendoff correctly point out, a purely syntactic approach is not enough to account for semantic-pragmatic effects. Nor is, from our point of view, a purely semantic-pragmatic approach, or a purely morpho-phonological account: they all fall short at some point. Therefore, a different, interface-oriented framework is necessary, taking into account syntax as well as semantics-pragmatics, and materialization in a monostratal theory (that is, dispensing with transformational operations). In building our own theory, we will make our axiomatic assumptions explicit, for the reader to be capable of evaluating internal theoretical coherence as well as empirical adequacy.

2. Revisiting the structure of the Lexicon

In this section we will build on a suggestion by Erich Groat and Juan Uriagereka (p.c.) regarding the ontology of elements involved in binding relations, and expand on how a quantum perspective could simplify not only the computational system but also the conception of the LEX of a natural language NL. By “quantum perspective” we mean, following the line of past works, that elements are not drawn fully-fledged from the LEX (cf. Lasnik, 1999, among many others), but comprise, *in abstracto*, all possible outcomes in terms of Case, Theta interpretation, category, and, we will argue here, also binding properties, and materialization (focusing only on N elements). Simply put, if a root $\sqrt{}$ can materialize as either a V or a N (say, *water_{N/V}*), then it must have, *in abstracto*, without syntactic context, the potentiality of being *both*. That state of superposition is called ψ -state, following a well-known convention in physics. The core of the quantum proposal (which we have developed in Krivochen, 2011, et. seq.; Krivochen & Kosta, 2013) is that a syntactic object comprises all possible outcomes *until* it is transferred to the Conceptual-Intentional and Sensory-Motor interpretative interfaces, where it collapses to one of those outcomes based on the syntactic context it appears in and the local relations it establishes with other syntactic objects (terminals or nonterminals) in that context (see Martin and Uriagereka, 2014 for a perspective on chains based on similar assumptions about contextually determined collapse; also Uriagereka, 2011). Thus, for example, a root comprises categorial potentialities for N and V (simplifying for expository purposes) until it is transferred: if the local configuration it appears in contains a D node, the

potentiality will collapse to N, whereas if the local configuration contains T, the root will collapse to V (or, in other words, sortal / eventive entity), both procedural nodes D and T being distributionally specified enough to generate a category interpretation at the interfaces⁷. LEX is thus simplified in terms of the number of elements it contains (as we do not need two separate entries for *water*, just a semantically underspecified root and distributionally specified D and T nodes, present in a derivation anyway), and a theory of the functioning of the interpretative interfaces is forced instead of enriching the computational system with operations –phase sliding, feature valuation / donation / copy, parallel Merge, among others- and elements –several kinds of features to trigger particular operations, Münchaussen features among the most recent-, which has been the trend in the last decade of MGG.

If we assume, following common practice in Minimalism, that a *subset* of the mental lexicon is to be selected to derive a sentence (be it in the form of a NUM-like array or dynamically, accessing the lexical space dynamically), that array, we claim, is defined as a set of lexical *types*⁸, of which an *a priori* unlimited number of tokens can be realized in a particular derivation, depending exclusively on C-I interface requirements. That is, each *type* (corresponding not to a fully-fledged, GB-like lexical entry but to *referential variables*, either eventive or sortal for VPs and NPs respectively) can be instantiated as a *token*, Externally Merged from the (type-)array as many times as necessary to generate not only a fully interpretable object, but also to conserve the information conveyed by a pre-linguistic conceptual structure CS (in the sense of Taylor et. al., 2011; Moss et. al. 2007; see also Uriagereka, 2008, 2012) in the most anti-entropic way possible, provided that each token is merged in certain positions in order to contribute to the final interpretation, all other operations being superfluous and thus eliminated from the theory. Basically, the idea behind this proposal is that syntax should do with the least possible number of tokens, assuming, as Chomsky (2013: 38, fn. 12) does, that, computationally, “*less is better than more*” (in very informal terms). The assumption we make at this respect is the following (see Krivochen, 2015b for more details):

10) *Minimal Selection:*

Select the minimal number of types that can instantiate a conceptual structure CS into a linguistic structure LS losing as little information as possible.

The intuition behind this assumption is clear: we want to linguistically instantiate a CS in the most economical way possible and minimizing derivational entropy, *ceteris paribus*.

⁷ See Boeckx (2010: 43): *Categories, like everything else 'lexical' (in the sense of language-specific) must emerge from the dynamics of the syntactic computation and the way it interfaces with the external systems.* We embrace here a highly componential approach to linguistic phenomena, such that neither narrow syntactic nor narrow semantic explanations (i.e., only in one domain, without appealing to their interaction) will be considered or, for that matter, even discussed in depth (mainly for reasons of space).

⁸ The status of lexical types is still not entirely clear, pending much research. For the time being, we will propose that each type be defined by its coordinates in a mental workspace, identifiable with the Long Term Memory (a Lexicon). We are claiming two non-trivial things here: first, that there exists a process of localization and retrieval within LTM, in line with proposals in Cognitive Linguistics. Second, that dependency establishment mechanisms, as we will see, take into account tokens as coordinates, *not* as sets of formal features. The biolinguistic impact of this hypothesis should be clear, insofar as it requires a deeper understanding of the mechanisms of LTM-information retrieval in order to fully understand how a derivation “takes place” in the mind, and why it happens the way it happens.

We will propose, as a provisional hypothesis, that LEX contains functional / procedural elements and conceptual elements (Sperber and Wilson, 1995; Escandell & Leonetti, 2000, 2004). The latter, providing semantic substance and reference potential; the former, providing the C-I interface with instructions regarding how to interpret the relations between conceptual elements: for instance, in a locative structure headed by a preposition P, both the *figure* and the *ground* are conceptual syntactic objects, denoting sortal entities, whereas the P is procedural insofar as it determines the kind of relation (central/terminal coincidence, following Hale, 1986) between its two arguments. In the same vein, T provides instructions as to how to anchor the underspecified reference of a root (Panagiotidis, 2010, 2014) in the time line, thus making it eventively referential (see Leonetti and Escandell, 2000 for details about the procedural role of Minimalism's *core functional categories*). Let us make our proposal explicit:

Crucially, we distinguish two kinds of elements present in syntax: *roots* (1) and *procedural elements* (2), the difference between them is given not by their format or inherent syntactic properties, but by their interpretation potential at the semantic interface:

(1) *Roots* are pre-categorial linguistic instantiations of a-categorial generic concepts (Panagiotidis, 2010, 2013, 2014; Borer, 2009; among many others). Generic concepts are “severely underspecified”, and are thus not C-I legible by themselves, but only under the scope of a procedural node (an assumption that bears resemblances to DM's ‘categorization assumption’, although our version is semantically based). Roots convey generic conceptual instructions, and their potential extension is maximal (expressible by the superset that properly contains all referential sets), given their semantic underspecification: bare roots have no (spatio-temporal) anchor, and thus their extension (in terms of the entities they can pick out) is *maximal*, including factual, non-factual, and counter-factual worlds.

(2) *Procedural elements* convey procedural instructions to the post-syntactic semantic parser as to how to manipulate a given semantic substance. Instructions play two main roles:

- Restrict reference in terms of a proper subset of the root's extension. Each element restricts the set in different ways, say:

$\sqrt{} = \{\alpha, \beta, \gamma, \lambda, \delta \dots \omega\}$ (each Greek letter represents a member of the extension of the root)

a. $\{x, \sqrt{}\} = \{\alpha, \beta, \gamma\}$

b. $\{y, \sqrt{}\} = \{\gamma, \lambda, \delta\}$

Where x and y are procedural elements having semantic scope over the root.

- Provide instructions as to:
 - Where to retrieve information? (the so-called ‘conceptual localizer’, Escandell and Leonetti, 2000; Sperber and Wilson, 1995)
 - What kind of information to retrieve?

Therefore, procedural elements convey an essentially locative meaning in the sense that they relate a figure (i.e., the root) to a ground (a set of properties / sortal entities), and they are thus predicates (i.e., functors) which have to have semantic scope (i.e., local dependency at C-I) over their (logical) argument.

Moreover, we will make a further distinction within conceptual elements for the time being, between *rigid designators* RD (quite in the sense of Kripke, although the notion of possible world is to be relativized to a mind, insofar as a world is propositional and propositions have mental entity following Relevance theoretic considerations) and *variables*. Sortal variables (which we will denote by Δ , using numerical subindexes to denote different tokens of the same type, as opposed to prime notation, which denotes different types), defined provisionally as non-rigid designators (including anaphors and pronouns), enter the derivation in a ψ -state as far as its phonetic form and semantic interpretation are concerned (that is, both their C-I and S-M interface properties): an anaphoric or a pronominal form will surface *depending* on the presence of a RD, identified with proper names and, possibly, indexicals (following Russell, 1917) in a local domain. Therefore, it is not the form that determines distribution (as in traditional Binding Theory, where “if α is X –anaphor, pronoun, R-expression-, then...”), but quite the opposite: it is the distribution that determines the phonological form. For instance:

11) John shaved himself

12) [ν P John [ν shaved [ν ~~shaved~~ Δ]]]

The V- ν structure form a single domain, semantically, an eventive domain (V) including an initiator (licensed by the causative node ν)⁹. Therefore, the sortal variable Δ in Compl-V is Spelled-Out as an “anaphor”, a term that we consider an interface epiphenomenon when referring to the phonological form of a syntactic object (as opposed to a set of semantic properties, with which there is not always a perfect superposition, as the existence of long-distance anaphors prove). In a more general spirit, we will consider all phonological forms epiphenomenal, as there is no univocal link between phonological form and syntactic distribution or semantic interpretation (for an empirical study about Case, see Krivochen, 2012: 77, ff.; also Trejo, 2013: Chapter 2). The possible phonological outcomes of Δ are the superposition of apparently two states, Case / theta roles being determined by the closest procedural head (T for NOM, ν for ACC, P for DAT; see Krivochen, 2012 for details):

a) Anaphor

b) Pronoun

However, it would be a stipulation to claim that RD is not a possible state of the referential system, and it would give RDs a special place within the theory: something we would like to avoid, except that data requires so. A theoretical revision of the proposal above, including RDs into the Δ system,

⁹ We will exclude lexico-syntactic proposals like Hale & Keyser’s (2002) for the time being, because it is not clear that the lexical structure (or l-syntactic structure) actually affects the binding properties of variables. In the case of a lexical decomposition model (e.g., Hale & Keyser, 2002; Mateu Fontanals, 2002; Jackendoff, 2002), the structure for the change of state predicate would be something along the lines of [John [[cause] [[GO] [John [[TO] shave]]]]].

considers only PF-variables (that is, elements whose phonological form is dependent on some other element), which are LF-referential expressions *all the same*. Consequently, the structure of (11) is actually (13) (maintaining traditional phrase marker labeling for clarity purposes):

13) [ν P Δ_1 [ν shaved [ν shaved Δ_2]]] (where $\Delta_{1,2}$ are tokens of the same type)

If hierarchy actually plays a role in reference assignment, it does so along with linearity: since top-bottom does not necessarily correspond to left-to-right (e.g., Uriagereka’s 2012: 56 Mirror Linear Correspondence Axiom), there must be some independent mechanism if syntax is to be inferred from phonology (a methodology employed widely in Generative Grammar, most notably since Kayne, 1994). However, if we look at things the other way around, departing from CS-LF and considering PF an accessory interface, but one that forces the system to collapse the ψ -state of variables to one of their possible outcomes to materialize them, the resultant system is quite different. Without invoking c-command, in pure set-theoretical terms, we propose the following distributional conditions for the Spell-Out of Δ variables¹⁰:

14) $\forall(\Delta) \mid \Delta \in D$ [a cycle], Spell-Out(Δ_1) =

- a) Pronoun *iff* $\nexists(\Delta_2), \Delta_2 \neq \Delta_1 \mid \Delta_2 \in D \ \& \ (\Delta_1 \in D'), D' \subset D$
- b) Anaphor *iff* $\exists(\Delta_2), \Delta_2 \neq \Delta_1 \mid \Delta_2 \in D \ \& \ (\Delta_1 \in D'), D' \subset D$
- c) Rigid Designator¹¹ *iff* $\nexists(\Delta_2), \Delta_2 \neq \Delta_1 \mid \Delta_2 \in \Sigma$ [a set of transferred cycles] $\& (\Delta_1 \in D'), D' \subset \Sigma$

The principles are subsumed to Optimal Relevance.

The last clause might seem a bit odd: what we say is that the distributional constraints in (14 a-c) are the *preferred* and *most economical* ways of accounting for materialization of type-variables, but considerations of optimal Relevance (that is, the maximization of positive cognitive effects when building a full propositional form at LF, see Sperber and Wilson, 1995; Wilson and Sperber, 2004) are ‘higher ranked’, so that a less economical S-O option for a particular variable might be chosen if, for a certain language L (and a certain context C), the most economic option is not the most relevant. This is in tune with Carston (2000) competition-based model of evaluation for explicatures (also in tune with recent developments in competition models within Harmonic Grammar), while adapting some claims to a formal model of the syntax-semantics interface. Notice that we have replaced the concept of ‘domain’ between nodes (as in ‘XP dominates X’) by the underspecified set-theoretical notion of ‘belonging’. It is important to stress that (14) is a generalization, dependent on the existence of vocabulary items that allow for the distinction between anaphors, pronouns, and R-expressions. Given the fact that only RDs make reference to whole derivations, being thus non-

¹⁰ The reader might find it useful to compare our proposal with that of Seely (1993) and his concept of “exhaustive binding”: *X is exhaustively bound iff every syntactically dependent member of the index of X is c-commanded by its antecedent; X is free otherwise*. Our proposal, however, does not rest upon the notion of c-command, but only upon set-theoretical terms that apply equally to alternative models of phrase structure.

¹¹ We take all proper names and semantically definite NPs (regardless of their specificity) to be rigid designators across possible worlds in a communicative exchange. However, this is just a terminological choice without impact on the theory itself, as far as we see.

locally defined, we can provisionally consider them ‘elsewhere cases’ if the B-List of a language L does not have anaphoric or pronominal forms.

What is the difference between D and Σ , a crucial distinction if (14) is to hold? If D are ‘cycles’, using the terminology of Uriagereka, 2012, among many others, then Σ is the interface result of unifying structurally finite-state *derivational cascades* (in the sense of Uriagereka, 2002b, as syntactic objects derived via monotonic Merge), after a syntactic object is transferred to the interfaces¹². Uriagereka (2002a: 11, ff.) points out that if two nominals within a domain D are syntactically marked for distinctness, LF assigns a different interpretation to each one. Case, for instance, would be a way to tell LF to assign the two DPs different interpretation in the configuration [DP V DP], as in “he saw him”. However, there are no details as to how this syntactic marking takes place, or, more essentially, why marking should be syntactic and not semantic, particularly taking into account the fact that Case can be accounted for in purely interface terms (Krivochen, 2011; see also DeLancey, 2001 for the perspective that inspired our own account). In our terms, while acknowledging Uriagereka’s observation, which we consider ultimately correct, distinctness is given by the CS, insofar as it determines the number of actants in a construal, and the lexical Δ types to be selected via Minimal Selection. Then, we propose to revisit Uriagereka’s remark as follows:

15) *If n tokens within an interface-defined domain D are instantiations of n different types, LF assigns a different interpretation to each token.*

The question of how domains are defined still holds. Unlike static phase-oriented conceptions of locality (e.g., Chomsky, 2001, 2008), we propose that a domain be defined as the *minimal syntactic object an interface system can fully read*. This implies that the interfaces have access to the output of each syntactic operation (see similar, but not so local proposals, in Boeckx, 2007; Stroik & Putnam, 2013), and decides whereas the relevant object is or not fully readable. The derivational dynamics we argue in favor of is as follows:

Concatenate $(\alpha, \beta) = \{\alpha, \beta\}$

Analyze_{IL} $\{\alpha, \beta\}$ [is $\{\alpha, \beta\}$ fully interpretable by the Interface Level IL? Does it contain superfluous elements?]

(Transfer $\{\alpha, \beta\}$ to IL if Analyze_{IL} results in legibility at IL)

Needless to say, this does not amount to the *every phrase is a phase* version of Epstein & Seely (2002), or Müller (2011: 156), as those accounts are, in our opinion, just as static as Chomsky’s

¹² This claim implies that the interfaces, or at least C-I, are computational. Arguments in favor of this line go along Jackendoff (2002), also see Escandell & Leonetti (2000, 2004) for a Relevance-Theoretic perspective. In any case, the conceptual structures (D-Structure) in Uriagereka’s (2012, 2014) CLASH model is, in our opinion, product of the application of *concatenation*, way more underspecified than its orthodox minimalist counterpart *Merge*, to generic concepts. This purely conceptual, pre-linguistic structure is what shapes the linguistic derivation via general semantic conservation trends (an anti-entropic approach to syntactic derivations, see also Uriagereka, 2011). Culicover and Jackendoff (2005) also argue in favor of computational S-M and C-I systems, but do not formalize a generative algorithm. Stroik & Putnam (2013: 13, ff.) argue, in a related way, that the computational system exists *within* the interfaces. We are thus not alone in our claim that the interfaces are computational.

phase theory focused on v and C as strong phase heads. What constitutes a domain is defined dynamically in a particular derivation, not *a priori*. In this sense, our proposal, while semantically oriented, is similar to that of Uriagereka (2002b), insofar as he defines relevant command units as objects assembled by means of monotonic Merge, and each command unit constitutes a linearizable object by virtue of being finite-state in nature (see also Uriagereka, 2012, Chapter 2). In this account, PF is the relevant interface that defines domains, whereas we take the complementary position, and focus on LF (while acknowledging that LF and PF domains need not coincide, since each system has its own legibility conditions, thus, $\text{Analyze}_{\text{PF}}$ and $\text{Analyze}_{\text{LF}}$ are not predicted to target the same syntactic objects).

How could a system as the one just outlined help us, for instance, explain the contrasts in (6) and (7)? Pending much research, we assume the structure in terms of variables is the following (6’):

6) Jan_i zag een slang naast zich/hem_{ij} (Dutch)
John saw a snake near self/him

6’) $[\Delta_1 [[\text{saw } \Delta'] [\text{near } \Delta_2/\Delta'']]]$

Consider that, in the Dutch example, the anaphoric / pronominal choice is to be done within an adjunct, headed by a preposition. The question is: is our PF assignment generalization (14) sensitive to adjuncts? The provisional answer is *no*. Even if, following Uriagereka (2002b), we concede that adjuncts and specifiers are derived as independent derivational cascades, it is not obvious that the assignment of phonological exponents is sensitive to phrase-structural considerations (i.e., the difference between head and non-head). As we will see in Section 2.1 below, the locality condition we propose for establishing dependencies between tokens depends on interpretative effects, and the assignment of different interpretations to different instantiations (tokens) of lexical types. If the interfaces receive chunked syntactic objects, as in a Multiple Spell Out model, a reconstruction process must take place after Transfer: the representation to be interpreted is one once again. We claim that only at this point does LF interpretation and PF phonology assignment take place (see also our discussion of Wurmbrand’s 2011 application of *phase theory* to explain binding asymmetries in Section 2.2).

Coming back to the specific example, the questions are: (a) is the most embedded Δ variable bound? And (b), why can it receive more than one phonological exponent? It is to be noticed that the optionality is not an exclusive feature of Dutch; Spanish presents it as well:

16) Juan_i vio una serpiente cerca de él_i/sí
John saw a snake near him/himself

In Spanish, optionality appears to be related to a matter of perspective, according to the native speakers consulted (and also being a native speaker of Spanish myself): the pronominal form is used to stress the speaker’s perspective, whereas the anaphorical form stresses (that is, ‘puts in the cognitive foreground’, roughly, ‘makes salient’) the subject’s perspective (i.e., [John]). Curiously, native Dutch speakers have provided intuitive accounts in the same terms. A formal, explicit account is presented by Rooryck & Wyngaerd (2011: 201, ff), which we will only briefly review here for reasons of space. Their perspective follows from a spatial account of anaphora, such that “*it seems that zich behaves just like himself when it comes to the interpretation of the nature of the*

location as well as the perspective adopted”, a consideration that coincides with the observation made by native speakers (the ‘perspective’ approach to logophoricity is also present in Charnavel & Sportiche, 2013 among many others, but is not part of the *loci classici* for CBT, rather, they advance BT beyond the ‘canon’). Rooryck & Wyngaerd (2011: 202) present evidence that the pronominal materialization is ambiguous in their locative reading, as in the following paradigm (taken from Rooryck & Wyngaerd, 2011: 202, ex. 80):

17) a. Zelda keek naar de verdieping onder zich. (Dutch)

Zelda looked at the floor under REFL

‘Zelda examined the floor under herself’ (She was standing on the landing of the stairs/

*She was standing on the lawn in front of her building)

b. #Zelda keek naar de verdieping onder haar/d‘r.

Zelda looked at the floor under her/her_{CL}

‘Zelda examined the floor under her’ (She was standing on the landing of the stairs/ She was standing on the lawn in front of her building)

The pronominal form has a wider locative value: notice that the pronominal interpretations include the anaphoric one as a superset. As the authors say, *zich* behaves like English *him/herself*, and that the pronominal form is ambiguous in its interpretation (a situation that goes well beyond the scope of narrow-syntactic accounts); however, the form *zich*, in certain locative PP contexts can also behave like English *him/her*. Therefore, we are lead to propose an *underspecified* variable which can behave as both, in a representation as the following:

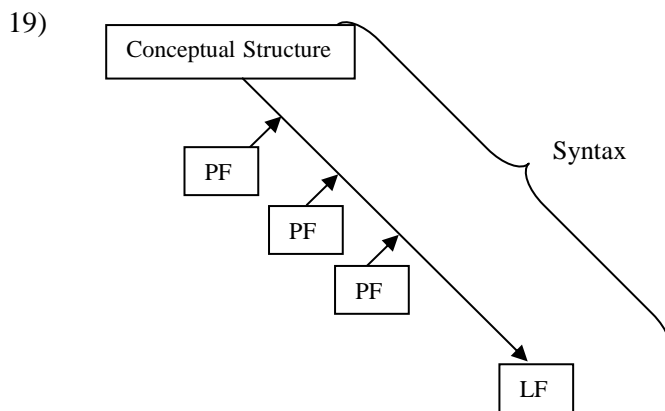
18) [Δ_1 looked [at Δ' [under Δ_2]]]

Notice that the most embedded Δ variable is within an abridged restrictive relative clause, [the floor [~~which was~~ under herself]], and therefore, under orthodox assumptions, the anaphoric element could not be bound, being within an adjunct (as *look* is an unergative V with an adjunct PP). However, under a semantically based approach to locality, not necessarily sensitive to complement/adjunct distinction (as the one we will develop below), a dependency can be established beyond the boundaries of a Governing Category. However, *interpretatively*, both phonological forms can generate interface effects, albeit *not* entirely coincident (thus not satisfying Relevance expectations in the same way), which justifies the existence of both forms in a single synchronic stage. Much research pending about this particular alternance, we believe it is covered by the Spell-Out generalization (14), providing the speaker with the possibility of materializing the variable as either a morphological pronoun or a morphological anaphor, taking into account that, while in localist terms there is variation with respect to a more concrete or a more abstract reading, a semantic-pragmatic interface account must also take into consideration the possibilities of Spell-Out in connection to the inferences the speaker wants to convey, related to the perspective issues we mentioned above. The idea, as a very provisional proposal, is that, in a situation where both a morphological pronoun and a morphological anaphor can Spell-Out a Δ variable, the decision is made with basis on pragmatic issues, formalized by Relevance Theory (see below for discussion and details).

We must stress at this point that it is essential for our semantically-based proposal that the status of a token-variable is determined *at the interfaces*, not in the syntactic workspace, as the latter is a mere n -dimensional blackboard in which free, blind *concatenation* applies to n elements, provided that those elements share format. This latter concept can be found in psycholinguistics as well as theoretical syntax, as the following fragment from Moss et. al. (2007) proves:

(...) conceptual representations form an interface between lexical information and other domains such as sensory and motor systems. This function introduces several constraints on the nature of these representations; irrespective of their content, they must be in a format that is readily accessible by both a range of linguistic and non-linguistic modalities of input and output, they must permit processing rapid enough to support on-line production and comprehension of meaningful speech at a rate of several words per second and to support rapid and appropriate motor responses to meaningful sensory stimuli in the environment, and they must enable flexibility of meaning across different contexts of use (...)

With this fragment in mind, let us spell out our architecture for the mental grammar, which is semantically based and driven (inspired on Uriagereka's 2012, 2014 CLASH model):



The arrows are meaningful: the interfaces take from the syntactic workspace the minimal units they can read, those units (syntactic representations built bearing conservation in mind) being determined by each interface separately¹³. In more orthodox terms, PF-phases and LF-phases *need not* coincide. From a MSO stance, a causative domain, arguably an LF-phase (unless phases are defined as feature-valuation domains, against which we have argued in previous works) contains more than a single Markovian cascade, thus corresponding to more than one PF-phase (see

¹³ The dynamic architecture proposed in the figure is loosely compatible with Lebeaux's (2009) *Homogeneity Conjecture*, according to which there is an extremely local evaluation procedure looking for violations to Principle C, which cannot be solved or fixed, and the derivation is immediately canceled. Such a procedure is on the same line as our Dynamic Full Interpretation Principle (Krivochen, 2012), according to which an operation applies if and only if it generates an interpretable object and/or it increases the informational load for the interfaces. In our terms, however, *all* conditions apply throughout the derivation, particularly at Spell-Out points, whereas Lebeaux (2009: xi) assumes Conditions A and B apply at LF. The consequences of adopting one or the other architecture will not be discussed here. The exceptional place of Principle C is also assumed by Reinhart (1986), as Principles A and B are assumed to apply at S-Structure, unlike Principle C (see Heim, 1998: 207).

Uriagereka, 2002b for details on PF-phasehood). In this particular approach we stress the tension (or ‘frustration’, see Binder, 2008; Uriagereka, 2012, 2014) between global semantic conservation tendencies and local linearization requirements targeting finite-state compatible sub-derivations. Each materialized output is taken here to be the result of the optimal solution to that frustration for L, in C. Information in the CS-LF path is *conserved*, whereas PF *adds* information in the form of phonological exponents.

The theoretical consequences of this approach are drastic: there are not three types of expressions (RD, anaphors and pronouns) as primitives of reference and binding, but only a single kind of underspecified sortal variable, comprising *in abstracto* all three possible morphophonological exponent states (thus the ψ nomenclature, following a well-known convention in physics) until it collapses at the LF / PF interface levels after transfer in a local configuration (see also Martin and Uriagereka, 2014; Uriagereka, 2011). The final state (i.e., the materialization of the variable), as we have said before, depends on the configuration in which the element appears, optimally on nothing else (and we will assume this scenario). Let us see another example:

20) ?John gave a book to himself¹⁴

21) [vP Δ_1 [v gave [VP gave [PP a book [[to] Δ_2]]]]]

The Double Object Construction DOC version presents little change with respect to binding properties:

22) ?John gave himself a book

23) [vP Δ_1 [v gave [VP gave [PP Δ_2 [[WITH] a book]]]]]

The semantic intuition that an entity cannot be at the same time source and goal of movement (either literal or metaphorical) is confirmed syntactically by our theory, in which, since both variables are in different domains, anaphor Spell-Out is not licensed. Notice (although this is not the topic of the present work) that locality and anti-locality conditions over dependencies can be derived from the system outlined, without the need to invoke independent principles or conditions.

It is useful to compare our proposal to the revision of CBT by Schlenker (2005), who proposes a *principle of Non-Redundancy*. His account, semantically based, focuses on evaluation of sequences containing R-expressions (proper names, demonstratives, and definite descriptions) and/or Non-demonstrative pronouns (notice the separation of demonstrative and non-demonstrative pronouns, reminiscent of that of Russell, 1917), each ruled by different interpretative algorithms. These notions, unlike in our proposal, are taken as primitives, and determine the application of an evaluation constraint known as *Non-Redundancy* (2005: 3):

24) *No object may occur twice in the same sequence of evaluation*

¹⁴ (20) might be acceptable in an interpretation like ‘John bought a book for himself’, as a self-gift. Crucially, that is a non-literal meaning of ‘give’, as there is no change of location involved. We are grateful to Luis García Fernández for calling this possibility to our attention.

The architecture Schlenker assumes also requires *transparent interfaces*, so that semantic/logic structure mirrors syntactic hierarchy. As syntactic hierarchy is based upon the notion of c-command, we find this point unclear. However, the most interesting point of comparison is the prohibition of having two instances of an object in the same evaluation representation, which in turn implies that the elements entering binding relations are defined independently. For instance, consider (25) (Schlenker, 2005: 2 ex. 2a):

25) *He_i likes him_i

In Schlenker's account, the ungrammaticality of (25) is given by the fact that there are two occurrences of the same object, bearing the same index. Therefore, (26) is predicted to be well-formed:

26) He_i likes him_j

Schlenker admits a further stipulation is needed (2005: 4): “*no two indices may refer to the same individual*”, which gives indexes the status of real elements in syntactic representations instead of mere notational clarifications (the latter, an improvement brought by the Copy Theory of Movement, see Chomsky, 1995). The principle of non-redundancy above can be expressed in indexical terms, along the lines of “no two objects in an evaluation representation may share referential index”.

While we will not discuss it here for reasons of space, we must briefly mention Reinhart's (1986) account, insofar as, as Heim (1998) points out, it integrates semantics and pragmatic factors, including “salience and overall plausibility” (1998: 209). The basic principle in Reinhart's proposal is the so-called *Coreference Rule*, which bears considerable resemblance to Schlenker's *Non Redundancy* principle:

Coreference Rule:

α cannot corefer with β if an indistinguishable interpretation can be generated by (indexing and moving β and) replacing α with a variable A-bound by the trace of β.

Notice that the condition includes a crucial mention to “indistinguishable interpretation”, which is an essential notion for our semantically-based locality condition over constituent dependencies. In type-token terms, to be refined below, *indistinguishability* is understood here as “being tokens of the same type”, and is a notion we will use in our own account. Reinhart (2006) also pursues an integration of pragmatic factors (within a general lambda calculus framework) in the resolution of anaphoric dependencies, as we can see in (27) (Reinhart, 2006: 165, ex. 1-2):

- 27) a. Lucie didn't show up today.
b. Lili thinks she's gotten the flu.

I. Lili ($\lambda x (x \text{ thinks } z \text{ has gotten the flu})$)

II. *Binding*

Lili ($\lambda x (x \text{ thinks } x \text{ has gotten the flu})$)

III. *Covaluation*

Lili ($\lambda x (x \text{ thinks } z \text{ has gotten the flu}) \ \& \ z = \text{Lucie}$)

Relevantly, *covaluation* is only a possibility if (27 b) is uttered in the context of (27 a), in which case [Lucie] is a ‘discourse entry’ and the pronoun is coreferential with this entry (Reinhart, 2006: 165). In this scenario, notions like ‘antecedent’ become blurry: do we want to restrict them to intra-tree configurations or do we allow discourse as a more general context within which to establish dependencies? Reinhart points out, correctly in our opinion, that binding is not essentially different from covaluation:

(...) *binding and covaluation are both defined in terms of identity of indices, or variables. The only difference, in the syntactic framework, is in the structural configuration: binding is coindexation under c-command* (2004: 166)

However, unlike Reinhart’s (1986), our theory is not dependent on structural types (A- / A’-binding) or (as in her 2006 definition of binding) a certain phrase structure theory (one that allows for unambiguous c-command paths to arise, in the line of Kayne, 1984), but purely on the type-token dynamics and an interface-based locality condition. Thus, pure configuration has a more central role in our account than it has in Reinhart’s (1986) proposal, although her (2006) revision is closer to our own ideas (even though Reinhart’s theory is more semantically based than ours). It is important to point out that the dependency of levels of representation (i.e., the mapping of a representation from S-Structure to LF, and different conditions applying to each), and the focus on indexing as the method establishing dependencies at LF, are not, in our opinion, objections to be made to the proposal, insofar as it was legitimately inscribed in the broader GB model of the mid-‘80s. We refer the reader to Heim (1998) for a thorough discussion of Reinhart’s (1986) proposal, and a revised version of the theory under an early Minimalist light. The general considerations we have made apply to both.

In our proposal, we do not need to account for ungrammatical examples like (22), precisely because, as we work with both syntax-semantics and syntax-phonology mapping, the core idea is that *Spell-Out is a (context-sensitive) function of syntactic-semantic construal*. Therefore, if two elements in a single derivational cascade are tokens of the same type, according to the Spell-Out criteria above, a pronoun could not have surfaced¹⁵, which relates to considerations about both locality and anti-locality (see Grohmann, 2003 for discussion about these concepts). The constraint of non-redundancy is thus replaced by our (14 a), which is to be interpreted as an evaluation procedure at PF (perhaps, part of Spell-Out itself) which assigns a phonological matrix to a variable depending on its local relation to other instances of the same type, or the lack of them, in a local domain. The structure of (25), then, would be [Δ_1 likes Δ_2], in which case the phonological matrix assigned to the structurally lowest variable (the deepest embedded element) at Spell-Out would correspond to an anaphor, Case being determined configurationally *at LF*, as we argued in Krivochen (2011, 2012) following the seminal idea of De Lancey (2001). (26), on the other hand, presents a structure [Δ likes Δ'] (with each variable instantiating a token of a different type), the two types determining the Spell-Out as either an R-expression or an exophoric (indexical) pronoun, Case considerations holding. In our theory, R-expressions, anaphors, and pronouns are not *a priori*

¹⁵ This point is essential insofar as our overall theory is, in the technical sense of Putnam (2010), *crash-proof*. In such a theory, or kind of theories, it simply does not make sense to account for what is not generated. If the interfaces filter out ill-formed objects, and do not transfer non-convergent units, then the issue of over / undergeneration does not arise: those are only problems in a crash-rife theory, in which the syntactic component works isolated from the interfaces and hands over arbitrary pieces of structure.

lexical elements or primitives of the theory, but the result of configurational relations read off *at* the interface levels, with the proviso that there is no one-to-one relation between phonological form and semantic interpretation.

This (admittedly very) brief account of Schlenker's and Reinhart's proposals should be useful for the reader to compare strong semantically-oriented approaches, assuming transparent interfaces (i.e., uniform mapping), with an interface approach involving syntax-semantics-pragmatics-phonology, assuming non-transparent interfaces. The focus on locality, present in Schlenker's approach (2005: section 3) is shared with our theory, but local domains are themselves defined upon different criteria. It is essential to point out that neither system is internally inconsistent, as they derive from different axiomatic assumptions. The choice (and this caveat includes Simpler Syntax, as well as other alternative, non-MGG approaches) depends on the focus of the researcher and the nature of the data.

2.1 *Spelling-Out variables:*

In this section we will expand on the criteria to Spell-Out variables and procedural elements, building on lexical decomposition approaches as well as internalist pragmatic theory. Early work in Distributed Morphology (e.g., Noyer, 1998; Harley & Noyer, 1999) distinguished two types of morphemes (i.e., terminal nodes):

- L-morphemes
- F-morphemes

The distinction corresponded quite accurately to that between lexical and functional categories devised within GB. However, this distinction was not built upon theta-assignment or semantic content, but Spell-Out possibilities. F-morphemes are defined as terminal nodes for which there is no choice when it comes to Vocabulary Insertion (i.e., Spell-Out). Their materialization, then, is said to be “deterministic”. This means that, given a certain set of features in a terminal node, Spell-Out has one and only one Vocabulary Item VI corresponding to that set.

On the contrary, L-morphemes are terminal nodes for which there is choice when it comes to materialization. According to Harley & Noyer (1999: 4):

“An l-morpheme is filled by a Vocabulary Item which may denote a language-specific concept. For example, in an l-morpheme whose syntactic position would traditionally define it as a noun, any of the Vocabulary Items dog, cat, fish, mouse, table etc. might be inserted.”

Appealing though this proposal might be, it still does not provide a satisfactory definition of “category” (noun, verb, etc.), but resorts to additional elements, *categorizers* (Marantz, 1997; Fábregas, 2005) to be merged with roots and thus define the category of the root within the Narrow Syntax NS. The substance of the proposal is thus not the kind of eliminative model we seek, but the core of the distinction between f- and l- morphemes can be of use: consider that pronouns and anaphors (or, better put, those phonological exponents which are classified as pronouns and anaphors) belong to a closed class, and that there is a very strict correlation between configuration and materialization, not only when it comes to choose between pronoun or anaphor, but also within

those categories, depending on the closest procedural node (P, ν , T), which determines Case interpretation at both interfaces, such that T generates a NOM interpretation on the closest sortal variable, ν generates an ACC interpretation, and P generates a DAT interpretation. At LF, interpretations correlate with thematic roles (see DeLancey, 2001: Lecture 3; Krivochen, 2012: 80, ff.), at PF, with inflectional morphology (including \emptyset affixes). Syncretism aside (for the sake of the present argument), the Spell-Out of anaphors and pronouns is optimally a direct function of the configuration Δ appears in, the choice of VI being restricted to a finite set of forms (since both pronouns and anaphors belong to so-called “closed classes”, where there is no productivity). However, when Δ is “free” in D (in the sense specified above), the choice of VI is predicted to be freer, insofar as any phonological exponent that does not belong to any of the finite sets of closed classes (including procedural elements, anaphors, and pronouns) can satisfy the variable and generate a legible object for the interfaces, in a strictly computational sense. It is to be noticed that not any phonological exponent can assure intelligibility, and this is a crucial matter should we take into account that if a structure is materialized, it is to be externalized: intelligibility thus becomes a major issue to take into account¹⁶. Notice that the problem of how to link form and meaning (or phonological and semantic properties) arises not only in separationist frameworks like DM, Nanosyntax, or our own, but also in lexicalist frameworks (see e.g., Ackerman et. al. 2011), insofar as there is no explicit linking rule or function relation between PF and LF. At this point, two options come to mind:

- 28) a. Implement a rich feature system
- b. Implement a “semantics-driven” interface system

The second option includes intelligibility in a context as a variable to take into account, as well as conservation of information from CS, provided that a NL has finite means to materialize, that is, give phonological form to, arguments and predicates involving roots in a semantic construal. The problem of which phonological signature (taking Hale & Keyser’s 2002 term) corresponds to which lexical type / token is far from being solved, as it is not obvious how the CS could contain some specification regarding the phonological exponent to be inserted in a certain node or nodes (if terminal fusion is allowed, following DM). An eliminative proposal would avoid diacritic elements, *ad hoc* indicators of particular requirements (including particular phonological exponents for each lexical type), but exactly how to is currently under research.

This framework needs an explicit formulation of the criterion for determining whether and where a Δ type variable is to be instantiated as a token; also, we need to have a criterion to measure derivational entropy when a CS is linguistically realized, and what we understand by “information”. The definition must be biologically based, and have computational tractability: both qualities Relevance Theory presents, and which have proven useful in studies about the property of

¹⁶ The distinction between convergent derivations and intelligible derivations is not new: garden path sentences and center-embedding are examples of convergent objects, but hard to interpret in context. On the other hand, sentences like [Parece Juan haber ganado] (lit. “seems John to have won”) are not convergent in orthodox Chomskyan terms (unsatisfied EPP in matrix T / unvalued Case in [John], etc.), but perfectly intelligible nevertheless. Arguably, the processing of these sentences requires an inferential correction of the input based on some criterion to establish the most similar intelligible and convergent candidate, but we will not go deeper into this issue here.

displacement (Kosta & Krivochen, 2014), phrase structure (Krivochen, 2011; 2014), and lexical semantics (Krivochen, 2015c)¹⁷. Being an internalist, (massively) modularist approach, which also vinculates pragmatics with semantics and syntax (see, e.g., Escandell & Leonetti, 2000, 2004; 2011), its possibilities to develop into an explicit and principled theory of the functioning of the linguistic LF component (complementary to Taylor et. al.'s 2011 neurocognitive proposal about conceptual structures, which we take to be pre-linguistic, as can be seen in (19)) are very promising. In Relevance Theory, the output of the syntactic derivation is an underspecified Logical Form, containing unbound variables (e.g., T), elements to be assigned a referent (e.g., DPs) and other imprecisions (e.g., lexical ambiguities). This LF undergoes several inferential processes of semantic-pragmatic nature in order to become a fully-fledged propositional form:

- 29) a. Decoding
- b. Disambiguation
- c. Referent Assignment
- d. Semantic Enrichment (including conceptual loosening and narrowing processes upon lexical meaning)

Moreover, the inferential processes necessary to build an *explicature* (a full propositional form, see Escandell and Leonetti, 2000, 2004; Wilson and Sperber, 2004) are driven by two principles of cognitive nature, relating cognitive cost (the inferential processes) and benefit (the inferences drawn from the whole computation, added to the meaning of the specific LF to be completed). Relevance, then, is a relative notion, not an absolute value, relating in each case computational cost and informational benefit. The parameters to take into account, in our opinion, are Relevance principles. Crucially, we are not sweeping the problem under the discursive rug, nor are we saying that the interpretation of elements is determined only by pragmatic means: take into account that Relevance Theory is not only a pragmatic theory, but an internalist theory that links semantic-pragmatic interpretation (including the representation of implicit meaning, or *implicature*) to syntactic form, by means of *procedural categories* present in the syntactic representation transferred to LF.

If, as we assume, Relevance principles play a major role in cognition (Sperber and Wilson, 1995) and are explicit formulations of economy and least effort conditions applying over all mental modules (Cf. Chomsky's various allusions, but no explication of, say, 3rd factor Principles), the fact that the Spell-Out of I-morphemes is not deterministic, insofar as it is not a function of construal, follows as a plausible hypothesis. Let us remind the reader about Relevance principles:

Cognitive principle of relevance:

Human cognition tends to be geared to the maximization of relevance.

Manuel Leonetti (p.c.), and Yus (2010) suggest that “*This is a biologically rooted principle that is applied to all kinds of processing, including linguistic processing. This is reflected in the general objective of RT: to identify underlying mechanisms, rooted in human psychology*” (2010: 680),

¹⁷ Blackwell (2003) presents an account of NP anaphora in Spanish from a pragmatic perspective, presenting a neo-Gricean approach. However, her inquiry takes Levinson (2000) as its reference, not Relevance Theory. Moreover, little attention is paid to the syntax-semantics interface and semantic construal. In any case, we encourage the reader to compare both approaches.

which makes it a plausible 3rd factor principle, way more explicit than any of the vague proposals Chomsky and most of his advocates have sketched over the last decade (see Chomsky, 2005; Boeckx & Grohmann, 2007, among others)¹⁸. Coming back to the issue of intelligibility, the second principle of Relevance claims:

Communicative principle of relevance:

Every act of overt communication conveys a presumption of its own optimal relevance.

By “act of overt communication”, RT means “ostensive stimuli”, not only linguistic but any deictic (in the original sense of the Greek verb δείκνυμι) device which locates entities –either sortal or eventive- in the cognitive space (a move that brings reminiscences of cognitive linguistics, see for example Fauconnier, 2007 for an introduction, and Zlatev, 2007, for a development of a localist theory of semantics. However, we take the expression “cognitive space” in a more abstract, mathematical-topological sense, see Krivochen, in preparation; Uriagereka, 2011).

Having introduced Relevance principles, we can now relativize the locality condition for variable binding we assume in our framework. It is essential to an interface theory that conditions over dependencies are not fixed beforehand, but *at* the interfaces. Consequently, it is not the case *a priori* that dependencies are established with the nearest element of the same kind, XP / X₀, in structural terms (as in CBT), but with *the nearest element that generates an interface effect*, interpreting the term as increasing positive cognitive effects while minimizing computational cost (Wilson & Sperber, 2004). Therefore, not even Rizzi’s (1990) Relativized Minimality is enough, insofar as the condition is sensitive to structural types, in turn dependent on X-bar theoretic assumptions. The condition we proposed in Krivochen & Kosta (2013: Chapter 5) is the following:

30) *Radically Minimalist Minimality (RMM)*

A node X and a node Z can be related at the interface level IL iff:

a. there is no Y structurally between X and Z that has a procedural instruction that can generate a drastic interface effect in X.

b. there is no Y structurally between X and Z such that Y is a token of either X or Z

Otherwise, Y is invisible for the purpose of interface effects.

Here, we would like to expand the scope of the theory to the distribution and interpretation of referential variables, be them eventive or sortal. If this interface-sensitive locality condition is actually a deep principle of the grammar, then the following configuration is to be expected:

31) [$\Delta_1 \dots \Gamma_1 \dots \Delta_2$]

¹⁸ Johansson (2013) criticizes the so-called “third factor” insofar as its content is highly unspecified. However, his objection does not apply to independently discovered mathematical / physical regularities underlying what is commonly (and perhaps misleadingly) referred to as “language design” (by, e.g., Chomsky, 2005), see Uriagereka (2012, 2014), Grinrod et. al. (2013), Saddy and Uriagereka (2004), Medeiros (2015) for excellent examples of independent evidence for mathematical / physical approaches to language structure.

In this case, the eventive token-variable Γ , corresponding to the materialized V (see section 3 below for discussion) is not an intervenient element for the purposes of RMM locality, insofar as it does not convey a procedural instruction to generate a drastic interface effect on the lower Δ ; nor is it a token of either of the Δ variables involved. Specific procedural elements bind different kinds of variables thus licensing different interface effects, and following RMM, we expect that T binds Γ variables, corresponding to eventive entities, and D binds Δ variables, assuming T does not generate an interface effect on Δ variables insofar as sortal entities do not express Time specification. Therefore, we can complete the configuration in (31) with procedural elements, to generate (32):

32) [$T \dots [D [\Delta_1]] \dots \Gamma_1 \dots [D [\Delta_2]]$]

(32) corresponds to a transitive construction, in which each Δ variable receives a different interpretation, by virtue of their closest ‘binder’ (D) being defined by different specifications in their logical entry. Let us exemplify the generative and interpretative power of the system by considering an instance of LDA (see Pica, 1991, for an alternative view):

33) [Plinius Maior] Egrediebatur domo; accipit codicillos Rectinae Tasci imminenti

*go out*_{3SgImpf} *house*_{Abl}; *receive*_{3Sg} *message*_{AccPl} *Rectina*_{DatSg} *Tasci*_{GenSg} *imminent*_{AblSg}

periculo *exterritae* –*nam* *villa* *eius* *subiacebat*, *nec*
*danger*_{AblSg} *terrified*_{DatSg} –*for house*_{Nom} *her*_{GenSg} *lied below*_{3SgImpf} [a volcano], *and-not*

ulla *nisi* *navibus* *fuga*–: *ut se* *tanto* *discrimini* *eriperet* *orabat*.
*any*_{NomSg} *unless* *boats*_{AblPl} *escape*_{NomSg}–: *that SE so-great*_{AblSg} *risk*_{AblSg} *save*_{3SgSubj} *beg*_{3SgImpf}

‘He left the house; he received messages from Rectina, wife of Tascius, terrified by the imminent danger –for her house lied beneath [Vesubius] and there was no way out other than by boat. She begged that [he] should save SE from such a great risk’

Pliny the Young, *Epistulae* VI, 16. Paragraph 8.
(Schuster, M. ed. *Plinius Minor*, Leipzig, 1933).

In this example, the reflexive [se], in italics, is not bound by the subject of the embedded clause (which is the contextual subject [Plinius Maior]), but by [Rectina Tasci], which is outside the relevant local domain introduced by [ut]. What is more, [Rectina Tasci] is not even the head of the main DP it appears into –[codicillos] is–, but an adjunct (if we pay attention to its locative nature, being a genitive DP; or we consider abridged relative clauses as NP adjuncts, extending the analysis of full relative clauses of Lechner, 2008 to abridged RC). Therefore, Rizzi’s Relativized Minimality is not enough, insofar as it is sensitive to structural types, and therefore the XP [Rectinae Tasci], adjunct to the NP [codicillos] is not intervenient: this implies that the only interpretation predicted by Relativized Minimality is that in which [se] is coindexed with the contextual [Plinius Maior], possibly a covert copy within the CP headed by [ut]. However, not a single edition of Pliny’s letters considers this interpretation¹⁹. Chomsky’s *phase* system is not better at this respect, as adjuncts are

¹⁹ See, e.g., González Fernández, J. (2005) *Plinio el Joven. Cartas*. Madrid: Gredos; Church, A. & W. Brodribb (1871) *Pliny’s Letters*. Oxford: Clarendon Press.

phases of their own, impenetrable to outside operations. How would the version of Minimality assumed here handle such a problematic case? Let us re-order constituents in a more familiar SVO order *only* for the sake of the exposition:

- 34) [_{CP} Ø (Rectina Tasci) orabat [_{CP} ut (Plinius maior) eriperet *se* tanto discrimini]]
RT ask_{PastImpf3Sg} [that PM save_{PastImpfSubj3Sg} SE so-much_{ABL} danger_{ABL}]
 ‘RT asked PM that he should save her from such a great danger’

Consider now that Latin offered the possibility of inserting a pure pronoun *eam* (feminine, accusative, singular) within the embedded CP, whose gender and number features would have unmistakably referred to [Rectina Tasci]: the choice of the reflexive pronoun is not arbitrary, nor is it an error (as some have pointed out). How can we explain the referential properties of [se] in this case? Let us now consider the locality conditions established in RMM: [Plinius Maior] is not a token of [Rectinae Tasci], and the interface effects of binding [se] with [Plinius Maior] are not satisfactory: the fragment conveys that Rectina begged Plinius to rescue *her*, it was not the case that she asked him to rescue *himself*. As we see, a purely syntactic / semantic approach would be ultimately insufficient, insofar as *both* syntactic and semantic properties of the construction are to be taken into account. In our opinion, RMM is a semantics-sensitive condition over the establishment of dependencies, instead of being sensitive only to structural types defined upon X-bar theoretical notions (like Rizzi’s 1990 Relativized Minimality, based on the notions of A- and A’- positions). Therefore, a “long distance dependency” is perfectly well-formed if the structurally intermediate elements are not semantically linked, via *token-Merge*, or via interface requirements (related to Relevance), to the relevant chain (in this case, <Rectina, *se*>); the difference between Latin *se* and English *–self* or Spanish *se* would reside in the possibilities of semantic linkage, which for the latter languages are restricted to the first available suitable antecedent, but which are less strict for the former, perhaps due to a situation of underspecification of the relevant anaphoric form, which can behave (in CBT terms) as either a pronominal or as an anaphor (much research pending). For details about the implementation of the system, we refer the reader to Krivochen (2013), here we will focus on the programmatic consequences of adopting RMM as the only locality condition in the theory (also reviewed in Krivochen & Kosta, 2013; Kosta & Krivochen, 2014). To begin with, a semantic-sensitive locality condition allows us to dispense with the notion of c-command in the definition of referential dependencies: binding takes place at the semantic interface (a conclusion that was partly reached by Chomsky, 1995 insofar as binding conditions applying at S-Structure also applied to LF, an argument in favor of eliminating S-Structure on economy reasons), and there is no reason to believe the C-I system is sensitive to X-bar phrase-structural notions like c-command. There are, however, reasons to think S-M is sensitive to Markovian dependencies, and linearization can be thought of as dynamic linearization in a MSO system (Uriagereka, 2012, 2014). The abandonment of the notion of c-command in binding in favor of semantics-sensitive explicit alternatives²⁰ allows us to provide explanations to phenomena like the so-called “novelty condition” of Wasow (1972):

²⁰ An alternative we will not comment on here, but is worth comparing with the ones we have mentioned in this work, is Reinhart’s (1986, 2006) proposal to replace Principle C, which has proven the most slippery, with pragmatic strategies, one for speakers and one for hearers (like Horn’s 1988 post-Gricean principles Q and R). However, Reinhart’s proposal has not been adequately developed, unfortunately, and, in our opinion,

35) *An anaphorically dependent element cannot have more determined reference than its antecedent*

(*apud* Uriagereka, 2012: 143)

Examples include the following paradigm (taken from Uriagereka, 2012: 143):

- 36) a. An officer_i walked in. The captain_{i/j} at first said nothing.
b. A captain_i walked in. The officer_{#i/j} at first said nothing.

The binding condition in (35) also predicts the marginal character of weak crossover instances:

- 37) a. Whose_i friend did a captain_{*i/j} kill?

Uriagereka claims that the condition in (35) is pragmatic in nature (without giving much detail about why it would arise): we think it is an interface condition, an LF interpretative routine which can be subsumed to more general Relevance principles on the presentation of actants in a proposition (already present in CS, but not specified enough). Therefore, the problem arises at the semantic interface if the variables are specified for referentiality (see Leonetti, 2012 for discussion about the degree of information that each referential type requires the speaker to retrieve), and at the phonological interface, insofar as the licensing conditions we proposed above for the surfacing of anaphors and pronouns, do not license the materialization of the conflictive form [whose].

Obviously, there is no ungrammaticality, but at most, marginality in the presentation of the entities. This, we think, is related to the fact that the default anaphoric reference resolution methods involve right-to-left parsing, and not the other way around. In these dependencies, the rightmost constituent takes its reference from a more specified DP, previous in the discourse (something particularly obvious in the case of pronouns): the marginality is related to an extra-processing effort, in turn generated by the cognitive gear to interpret each stimulus as optimally relevant. In this case, there is no extra positive cognitive effect generated by the reversed order [-specified...+specified]. C-command plays no role, as the explanation is semantic-pragmatically related. In the specific case of weak crossover, where a pronoun is involved, RMM and the conditions specified above for the materialization of variables also seem to be more effective than a purely syntactically related explanation.

A second consequence, of major importance for the architecture of the grammar, is that there is no real difference between long-distance and short-distance dependencies, insofar as the mechanisms for the establishment of dependencies are the same in both cases. Not being tied to phase-theoretical or X-bar theoretical considerations, the notions of, for example, long-distance (crossing more than one CP) and short-distance (within a CP) WH-movement make little sense: all that matters is that there is no intervenient element between operator and variable, no matter the position or the structural type. Instead of a direct, transparent syntax-semantics mapping, in which the semantic component is exclusively interpretative, we argue in favor of a mixed approach, in which the semantic component actively participates in the establishment of operator-variable dependencies,

does not constitute an independent, pragmatically based, approach to binding. Notice that the fact that a pragmatically based proposal comes from the linguist who formalized c-command (a fundamental notion in CBT) is highly significative both theoretically and historically.

and the phonological component is also sensitive to these dependencies insofar as the materialization is, optimally, a function of operator-variable relations. The non-appropriateness of purely syntactic explanations will also be analyzed in the next section, when we review phase-theory (the most recent Chomskyan version of locality conditions) and its relation to some binding problems.

2.2 Phasehood and anaphors: is phase theory necessary for BT?

The relatively recent arousal of phase theoretic approaches to locality (that is, locality as *impenetrability* instead of locality as *non-intervienency*) influenced BT, insofar as local domains can be defined, in this framework, by taking into account the notions of *edge* (a plausible target for operations outside the relevant phase) and *phase domain* (impenetrable for outside operations). Therefore, the concept of governing category was replaced by that of *phase*, identified with CPs and (causative-transitive) *v*Ps, possibly also DPs (Chomsky, 2007) and, parametrically, TPs (Gallego, 2007). If a node is impenetrable for the purposes of further computations, it is to be expected that an element cannot be bound from outside a phase. Wurmbrand (2011) provides a paradigm to support such a perspective:

- | | |
|---|-------------|
| 38) a. Mary believes [<i>v</i> P John to have portrayed himself well]. | phase |
| b. *Mary believes [<i>v</i> P John to have portrayed herself well]. | phase |
| c. Mary believes [<i>v</i> P herself to have portrayed John well]. | not a phase |
| d. Mary believes [<i>v</i> P herself to have portrayed herself well]. | not a phase |
| e. Mary _i believes [<i>v</i> P John to have portrayed her _{i/j} well]. | phase |

Wurmbrand (2011: 60)

In order to account for the paradigm, Wurmbrand is forced to make the following assumptions (2011: 60):

- An interpretable unvalued feature in a *phase* projection postpones *Transfer*, otherwise, Full Interpretation would be violated.
- PRO postpones phasehood of *v*P; an interpretable, unvalued T postpones phasehood of TP (if TP is complement of V).
- Object anaphors have no effect on phasehood since they are not in a *phase* projection.

The *ad hoc* character of these assumptions need not be stressed. PRO, the subject of the embedded infinitives, is required to have an unvalued interpretable feature, valued from outside the phase. However, a principled explanation of how the presence of PRO would affect phasehood (and exactly where phasehood is determined, so that this influence takes place) in some cases is missing. Elements and operations are multiplied, and so are stipulations: why (c) and (d) do not constitute phases? The syntactic component should not be sensitive to the variation (and distributional constraints) between [herself] and [John], at least not until reaching LF. However, in order to reach LF, a syntactic object is to be transferred, therefore, be a *phase*. The argument is circular, to the best of our understanding. The question to be asked, from our perspective, is not “why some sentences in the paradigm are grammatical”, but “why, in grammatical examples, the elements surface as they

do”. The reason is that, in an interface-driven architecture, derivations are crash-proof, in the sense that local interface “monitoring” detects ill-formed objects and filters out the sub-optimal candidate before the derivation concludes (Putnam, 2010: 6, ff.). That is, contrarily to most proposals, including Lebeaux’s (2009), we think a theory of the grammar should not accommodate to explain ungrammatical examples, but to generate, describe, and explain, grammatical and acceptable ones. Therefore, for instance, the explanation Lebeaux gives for Principle C applying all throughout the derivation, which includes the assumption that, if it applied at LF, then strong crossover effects would be allowed, is not –in our terms- acceptable, as the unwanted candidates can also be ruled out without assigning Principle C a special status. The procedure is quite the same in Wurmbrand’s approach: certain constructions, within vPs, are assigned a special status, and binding properties follow not from general principles, but from exceptions (in this particular case, related to feature-valuation configurations).

Also, it is not clear to us why some vPs should be phases and other should not, provided that there is no verb-typology difference with respect to the matrix V. Most notably, it is not clear why example (38 b) would require an account in terms of phasehood (i.e., locality as impenetrability) instead of Minimality (i.e., locality as non-intervenieny). Let us analyze the paradigm taking into account the principles outlined above for Δ variables materialization: prime notation indicates different *types*, whereas numerical subindexes indicate *tokens* of the same type. The structures are the following (maintaining Wurmbrand’s labeling):

- 39) a. [Δ_1 believes [vP Δ'_1 to have portrayed Δ'_2 well]]
 b. *[Δ_1 believes [vP Δ'_1 to have portrayed Δ_2 well]]
 c. [Δ_1 believes [vP Δ_2 to have portrayed Δ'_1 well]]
 d. [Δ_1 believes [vP Δ_2 to have portrayed Δ_2 well]]
 e. [Δ_1 believes [vP Δ'_1 to have portrayed Δ_2/Δ'_1 well]]

Notice that the structures of (39 b) and (39 e) are the same, except in the exophoric reading of (39 e), in which the lowest Δ variable is free and refers to a different entity. The problem, in our framework, arises as a bad choice of phonological exponent for a variable, not because of phasehood reasons. (39 a, d) display a situation in which there are two Δ variable tokens within a local domain, therefore, it is to be expected that the structurally lowest token is Spelled-Out as a reflexive anaphor. In (39 d, c), the embedded Δ variable is near enough the matrix, undominated Δ , as there is no intervenient node, the relation is local enough for the lower Δ to surface as an anaphor. (39 d) also displays a token of the same type in the lowest position, which, being contained in the domain of another Δ variable, also surfaces as an anaphor, the reflexive reading being licensed by both the syntax (containment relations) and semantics (CS). (39 b), we argue, displays only a problem of materialization (i.e., PF), not of the syntax-semantics interface. That is, according to the conditions established above, the materialization of the embedded Δ variable should have been pronominal, as the variable is locally free (i.e., free in the minimal semantically relevant object containing Δ): that is the case in (39 e). In few words, our system does not generate (39 b), since it is a suboptimal candidate, considering the possibility of materializing (39 e).

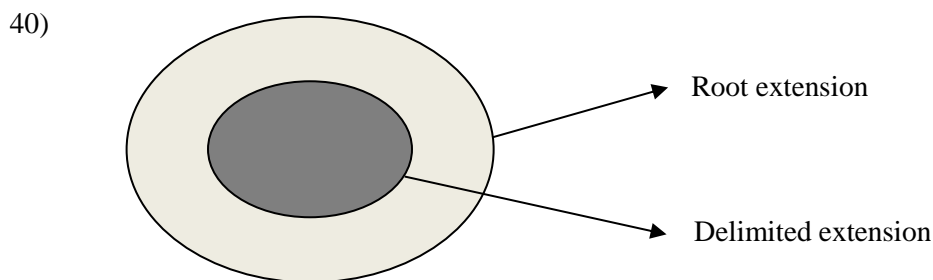
3. Simplifying the Lexicon, extending the proposal

So far, we have sketched a possible theory of how PF is a *function* of syntactic-semantic construal. This proposal builds on CBT insofar as three kinds of expressions are distinguished: anaphors, pronouns, and RD. Of those, and taking the term from the studies in *consecutio temporum* and temporal relations across clauses, anaphors have always *relative reference*, RD have always *absolute reference* and pronouns can have either, always defining “absolute reference” in terms of “pointing to something outside the co-text”. Now, an elegant solution to lexicon design would set a uniform criteria for referential variables, be them sortal or eventive. This is what we will propose now, as an extension of the system sketched above containing procedural elements and Δ sortal variables: a NUM consists of

- Δ *type* variables, corresponding to sortal entities
- Γ *type* variables, corresponding to eventive entities
- Procedural *type* elements

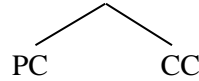
That is, contrarily to Chomsky (1995, 2000, 2001), our NUM contains *types*, not *tokens* (see Krivochen, 2015b for an extended analysis of this idea and its application to displacement phenomena). Moreover, *types* do not correspond to fully-fledged lexical items with featural specifications which determine their syntactic, semantic, and phonological properties, but to variables in the sense specified above. Following Enç (1986) and Pianesi (2006), Leonetti (2004a, b); among others, we will pursue an indexical, referential approach to tense, a functional layer affecting (having semantic scope over) underspecified Γ variables, generating a V categorial interpretation at LF.

Relevance Theory distinguishes two kinds of elements within the LEX: conceptual (CC) and procedural (PC). The former convey semantic substance, and roughly corresponds to *roots* in lexical decomposition models: too underspecified to undergo referent assignment but denoting a class of entities, being subjected to processes of conceptual loosening and narrowing (Escandell & Leonetti, 2011; Wilson and Sperber, 2004). The latter convey rigid instructions as to how to manipulate conceptual content, they are logical functors that have scope over their arguments. Thus, for instance, a root is not interpretable by C-I unless under the scope of a functional-procedural category -say, D, which provides the potentiality of definiteness, see Leonetti, 2012 for discussion and examples in Spanish-, a point that has been made, among other, by Panagiotidis (2014). The lexical structure of a noun, under our revisited approach, is something along the lines of (40):



In the more familiar tree-like form,

41)



Scope relations generated via derivational diachrony (see Epstein et. al., 1998 for a definition of c-command under these assumptions, which seems to be relevant for LF scope) guarantee that the instructions conveyed by the procedural predicate restrict the reference of the conceptual category, and not the other way around. This situation is what we have called “conceptual-procedural symmetry”:

- 42) *There cannot be bare roots without having been merged with a procedural node or procedural nodes without having been merged with a root at the syntax-semantics interface.*

In other words, predicates without arguments are not interpretable, and neither are bare arguments without a procedural category limiting their reference. The conceptual-procedural symmetry, in our opinion, captures both the insights of Wilson (2011) about conceptual elements containing instructions for their localization (since, if conceptual information is understood as a perturbation of the mental lexical field where all lexical entries are located –understood as a phase space- there is some inherent information with respect to where to find the relevant lexical attractor, see Krivochen, in preparation for extensive discussion and mathematical formalization); as well as Leonetti and Escandell’s (2012) argument that both kinds of categories should remain distinguished (since procedural elements select a narrower space within the lexical field, as seen in (40)). At this respect, eventive and sortal entities are formally equivalent: they both need a procedural layer delimiting the extension of the root: D is to Δ what T is to Γ . Now, are events fully assimilable to sortal entities? Both syntactic and semantic evidence seem to point otherwise, some basic similarities notwithstanding. We will briefly develop a relativized scenario, pending much research. Leonetti (2004a, b) posits that the Spanish imperfective praeteritum is, *when embedded*, anaphoric in the traditional (i.e., pre-BT) sense, being referentially dependent on a previous constituent which denotes an independent temporal coordinate:

- 43) a. $[_{TP} \text{ cogió}_i [_{VP} \text{ cogió en brazos } [_{DP} [_{DP} \text{ al niño}, [_{CP} \text{ que lloró}_j]]]]]$
Picked-up_{Perf} in arms the boy, who cried_{Perf}
- b. $\text{Cogió}_i \text{ en brazos al niño, que lloraba}_i$.
Picked-up_{Perf} in arms the boy, who cried_{Imperf}

According to Leonetti, the interpretation of (43 b) requires binding the second event to some temporal antecedent, either co-textual (as in the example) or contextual. The perfective praeteritum is, in terms of Berthonneau and Kleiber (1993: 55), *referentially autonomous* in the sense that it apparently does not need this kind of antecedent in the discourse or in the context, but it can be non-locally bound: as such, we would assimilate the imperfective praeteritum to the category of pronouns, which can either be bound outside an immediate domain or not be bound at all. While it is true that T in subordinate clauses is interpreted in relation to the T in the matrix clause, the interpretation is not anaphoric in the CBT sense, unless the binding domain is stretched beyond the limits of the domain (say, CP, the nearest phase) to the next Γ variable higher up in the structure: as

we saw when considering Wurmbrand's proposal, *phase* theoretical assumptions are of little if any help, provided that the referential dependency between tenses goes beyond the limits of a CP and a vP phase (see the bracketing in 38 a, above). However, the undesirable consequence of this system is that a stipulation is needed, namely, that the highest Γ variable is *absolute* in the traditional sense; otherwise, an infinite chain of embedding would be necessary in order to bind all variables (see Bennis, Pica & Rooryck, 1997: iii for a similar argument involving a different problem with a transformational approach to pronouns and anaphors), and such a computation is not tractable with finite memory resources. The definitions we have provided above can help us avoid such stipulation. Consider, for example, (44):

- 44) Juan dijo que, [_{Top} cuando yo viniera], él ya habría terminado el trabajo
John said_{PastPerf} that, when I came_{PastImpf}, he already would finished_{Part} the work

We must take into account that the temporal adjunct has been topicalized within the embedded clause, which might affect the event structure in terms of Γ variables if a transformational approach to topicalization is adopted. In any case, there is a chain of temporal coordinates going up to the perfective praeteritum, which is not under the scope of any other T coordinate (being thus “absolute” in traditional terms). Let us try to make the structure explicit, in terms of predicate(argument):

- 45) $\Gamma_1(\Delta_1, ((\Gamma'_1(\Delta'_1)(\Gamma''(\Delta_2))))$

We are very well aware that primes and numerical subindexes are not part of the LEX or the derivation, just notational ways to show that there are different *types* or different *tokens* of the same type in the derivation. Possibly, this is not relevant until Transfer, and the identity between tokens of the same type -as well as the difference between types- is established by C-I based on the definition of each type in terms of its location in the conceptual space:

- 46) A point²¹ $p = (\{x, y, z \dots n\} \in W_X)$ is a *token* of a single-type LEX_s , where $x, y \dots n$ are dimensions of a workspace W .

Any element to be used in symbolic representations is defined by coordinates in the conceptual space. The definition of T, however, implies more elements than the collapse of Δ variables: a given semantic Tense is the result of combined Time, Aspect, and Modality specifications, such that (in the traditional featural characterization form, based on Palmer, 2001: Chapter 6):

- 47) Present = [+ present], [- perfective], [+ realis]
 Past = [- present], [\pm perfective], [+ realis]
 Future = [- present], [\pm perfective], [- realis]

²¹ More recently, Uriagereka (2011) and Krivochen (in preparation) define types as perturbations of a topologically ultrametric lexical field. While crucial for other realms of empirical research, the difference between ‘point’ and ‘perturbation of a field’ is not really significant here. We just wanted to point out it exists.

Let us make the content and semantic contribution of these “features” explicit: notice that the perfectivity dimension does not actually correspond to a valued syntactic dimension (as a Case feature would), but to a decision on the speaker’s part to present an event (i.e., a VP) as a whole, regardless internal complexity (perfective) or as a developing process, extending into time (imperfectivity). Therefore, in a syntactic-semantic representation, the terminal containing Asp procedural instructions as to how to interpret the event should have semantic scope over TP (recall that Γ variables, i.e., V(P)s must be bound by T locally, following RMM). In turn, the Asp-T dynamics configure the *dictum* in Bally’s terms, presenting a proposition with all variables bound. The *modus* is described in terms of applicability in a certain propositional context (in RT terms), which can be the one assumed by default (realis) or an *ad hoc*, non-factive context (i.e., irrealis)²². In logical-semantic terms, the *modus* has scope over the *dictum*, which leaves us with a clausal architecture [Mod [Asp [T [V]]]]. Notice that the proposal of splitting Tense is not to be confused with Pollock (1989) and Chomsky’s (1991) IP-explosion, comprising AgrP and T, nor with van Gelderen’s (2012) recent split-TP proposal. Our decomposition is semantically motivated, and has no impact on feature valuation operations, as we do not assume features to be real linguistic / mental entities. However, as we have argued in Krivochen (2012), the procedural elements T, Asp, and Mod, influence the interpretation of sortal arguments, such that correlations between definite / generic interpretations on DPs and certain time / aspect specifications can be accounted for without feature valuation considerations. For instance:

- 48) a. The mammoth was a mammal (T: past. Asp: Imperfective. Mod: realis)
- b. The mammoth hit the tent (T: past. Asp: Perfective. Mod: realis)

In our opinion, a model with comprised T (or Inflection) could not easily accommodate this simple contrast, which we have developed elsewhere. It should be clear that the three components of Tense: (at least) Time, Aspect, and Modality, can influence other constituents in syntactic-semantic structure independently or even cumulatively (that is, more than one procedural node influencing the same elements, as is frequently the case with past + perfectiveness vs. present + imperfectiveness over DPs). This dissociation is particularly relevant for Leonetti’s (2004a, b) account, insofar as he claims that the imperfective past is anaphoric (again, in the pre-CBT sense) *because* it is imperfective. In our proposal, we will not assert a causal relation between imperfectivity and anaphoricity, but rather try to explain the morphological materialization of certain variables in certain context, their binding properties being derived independently (even if the empirical coverage turns out to be similar). Therefore, the correlation between genericity and imperfectivity, which Leonetti (2004a: 505) correctly points out, is dissociated from the binding properties of a variable, insofar as aspectual features are, in our system, independent from the basic locality condition we have established, and which rules the assignment of phonological matrix to those variables.

Within this system, in which Tense is decomposed, we can now analyze the Spell-Out and binding properties of Γ variables, corresponding to eventive entities, in similar terms to those used for Δ variables, following and extending the proposal by Groat & Uriagereka. The idea we put forth here, to be developed in future research, is that binding properties of T-V complexes depend on the

²² Also Comrie (1985), based on an analysis of Dyirbal language, posits a *past-present* vs. *future* distinction based on modality, adopting the terms *realis* and *irrealis*.

construal, not on specific properties to be related to single units due to lexical (featural) specifications.

For instance, some verbal forms, in Spanish most notably *subjunctive mood*, are mostly limited to embedded clauses, under the scope of C_[−realis] and/or a polarity item, for instance:

49) Creo que Juan viene
*Believe*_{1SgPres} *that John come*_{3SgPresInd}

50) No creo que Juan venga
*Neg believe*_{1SgPres} *that John come*_{3SgPresSubj}

Latin offers a similar paradigm, with the caveat that the morphology does not correspond exactly to semantic interpretation, as we can see in (51):

51) Timeo ne venias
*Fear*_{1SgPresInd} *not come*_{2SgPresSubj}
'I fear the hypothetical case that you should come'

In this case, the operator is not polar, but modal: it does not correspond to logical negation, but to an irrealis fact (denoted by a V displaying subjunctive morphology), a possibility (as can be seen in the translation). The event of coming has not taken place, and is not taking place at the moment of utterance, it belongs to the realm of the future, and the future, as we predict in (46), is irrealis.

Even English, with its impoverished morphological exponents, allows the differentiation between [+ realis] and [− realis], in other words, *factual* and *non-factual*:

52) The exam *is* easy

53) I hope the exam *be* easy

Consecutio temporum, a traditional approach to binding properties of T (analyzed within generative linguistics by Ladusaw, 1977; Roeper, 1987; Williams, 1994; Higginbotham, 2009), determines that the temporal interpretation of the subjunctive form in (52) depends on that of the main, indicative V. In (51), however, the verbal form is undominated by any other T mark, and is interpreted in what is traditionally referred to as an “absolute sense” (Comrie, 1985)²³. The problem, we think, is much more complex than with nouns, because componentiality is a pervasive factor that relativizes any claim we could make regarding distribution: interlinguistically, any *morphological* tense can appear in any position (i.e., embedded or matrix). The *semantics* of tense is quite another problem, which forces us to adopt a separationist perspective: the morphological exponent is not a reflection of semantic content, a situation we have referred to above as *non-transparent interfaces*. Are constraints formulable in terms of distribution alone? We believe not, because of this lack of correlation between form and meaning. Consider, for instance, the English simple past form:

54) I loved her (for a moment / for ten years)

²³ In what follows, we will not deal with truth-conditional problems, insofar as our concern is exclusively intra-linguistic. However, see Higginbotham (2009: 86, ff.) for discussion.

The PF exponent [-ed] is underspecified with respect to Aspect, which leaves open both the perfective *and* the imperfective meanings until another constituent collapses semantic interpretation to either. However, as in the case of lexical ambiguity (e.g., bank = financial entity / object on which to sit), both are entertained for a fragment of a second, until a decision is made and the following co-text proves this decision either right or wrong. In any case, we cannot say “the imperfective past form is anaphoric / pronominal” in CBT terms, because phonological underspecification does not allow so, just as we cannot say “a materialized definite determiner is enough to guarantee univocal reference” (Cf. Russell, 1905). This raises the question whether one can say that T is actually “anaphoric”, if every subordinate form is to be interpreted in relation to the T specification of the matrix T. Higginbotham (2009: 88) proposes a neo-davidsonian semantics for tense anaphora, in which tenses are under the scope of quantifiers, and bound to either the moment of utterance *u* or a previous event *e*. Let us give an example: the proposed logical structure for (55) is (56), assuming (55) admits two interpretations:

55) John saw a woman who was ill (adapted from Higginbotham, 2009: 87)

56) $[\exists e < u] [\exists e' < u/e] [\exists x: \text{woman}(x) \ \& \ \text{ill}(x, e')]$ see(John, *x, e*) (the < indicates anteriority)

The two quantificational variants determine two possible interpretations:

- a) *e* is bound to *u*
- b) *e* is bound to *e'*, in the matrix clause

Therefore, the anaphoric (in the pre-CBT sense) interpretation of the embedded T is relativized, as the reference of [be ill] can be either endophoric (interpretation (b)) or exophoric (interpretation (a)). Constraints on *consecutio temporum* could then be formulated as constraints allowing a certain form to refer exophorically, thus bound to *u*, or forcing it to find an antecedent endophorically, thus bound to *e'*. This kind of constraint predicts that tenses that *can* refer exophorically *can* also refer endophorically, but those that *must* refer endophorically *cannot* refer exophorically, as expressed in (57):

57) a. Present, simple past (perfective and imperfective), future (perfective and imperfective) → *can* refer exophorically

b. Plusquamperfectum (past perfect), anterior past (not present in English as a separate morphological form) → *must* refer endophorically

Some clear-cut cases might help clarifying the scenario:

58) # I had bought beer

In (58) there is no *e* to which *e'* can be bound: being a simple matrix sentence, reference is obligatorily exophoric. However, as it is, there is no context / co-text that provides an anchoring point for the event, therefore, there is no possibility to assign an LF interpretation to the proposition. Moreover, it is impossible to come up with an *ad hoc* proposition to save the LF interpretation and build an *explicature* from (58). This latter possibility is a last resort, particularly useful with tricky tenses, like the present perfect:

59) I have bought beer

Why is (59) acceptable without any overt context, that is, without being embedded, either syntactically or discursively (i.e., as part of a conversation, where the e to bind the present perfect is contained in a previous utterance)? The multiple interpretations of the present perfect, together with Relevance theory, can help explaining the behavior of a tense we would expect to be endophoric, relational. We can find four very basic uses for the present perfect (based on Leech & Stvartvik, 1975):

- 60) a. Indefinite recent past (event finished in the past)
- b. Indefinite past experience (often accompanied by “ever” / “never”; event also finished in the past)
- c. Resultative past (event finished in the past, but has present results)
- d. Present relevance of a past event (event started in the past, and is still ongoing at the time of utterance)

In these uses (as well as some we have not included, like future reference within an adverbial clause, because they appear only in embedded clauses), there is an added contextual proposition, necessary to save the LF representation and due to the expectations of Relevance the ostensive stimulus generates (see the communicative Principle of Relevance above). In the case of the present perfect, the added proposition involves u , with the condition that the beginning of e and u cannot be simultaneous. Therefore, (59) could be paraphrased as follows:

61) (At some point in the past), I bought beer

Notice that this “LF-salvation” technique does not work with a clear-cut bound tense, like the past perfect:

62) *At some point in the past, I had bought beer

Anteriority to u is not enough: there must be another e , previous to u , which binds the past perfect e' . In the terms we have discussed above, with some improvements of Higginbotham’s notation (2009: 87), the minimal structure that licenses the past perfect should be the following:

63) [... [_{TP} Γ'_1 ... [_{TP} Γ_1 ...]], where $\Gamma_1 < \Gamma'_1$ & $\Gamma'_1 < u$

In (63), Γ variables are necessarily bound in temporal terms, but they are tokens of different types (hence, the prime notation). We have introduced a further requirement, derived from the brief discussion above, namely, that the most embedded variable is to be bound by another variable, posterior to it but anterior to u . In our system, where Spell-Out is defined by structural configurations, it is not at odds with the data the proposal that (63) is precisely the configuration that licenses a past perfect materialization, *ceteris paribus*. Notice that present perfect does not require the same added condition, but rather a modified version which impacts on its distribution and use:

64) [... [_{TP} Γ'_1 ... [_{TP} Γ_1 ...]], where $\Gamma_1 \leq \Gamma'_1$ & $\Gamma'_1 \leq u$

We take \leq to mean “either anterior or simultaneous to”, in order to account for the values of the present perfect seen above. Needless to say, in the case of the present perfect, the matrix Γ' variable binding the most embedded variable (the one to be materialized as the present perfect form) can be covert, in the form of an *ad hoc* proposition added to rescue the representation at LF and make it relevant in the technical sense (as in the parenthesized clause in (61)). The relation of anteriority / simultaneity between the event denoted by the present perfect and u , in which the event has effects, is captured in the second condition, which expresses optionality.

Based on this admittedly limited data (to be expanded in future studies), it is possible that part of LF interpretative routines consist on satisfying the existential quantification conditions proposed by Higginbotham. That is, the constraints in (57) can also be expressed as follows²⁴:

65) Endophoric tenses: $\Gamma_n \leq \Gamma'$

Exophoric tenses: $\Gamma (\leq \Gamma') \leq u$

The condition on endophoric tenses is recursive, that is, we can have an *a priori* undetermined number of variables (symbolized by the n subscript), with the condition that there is a binding relation between them (being tokens of different types). The exact nature of the constraints is still to be clarified in cognitive terms, if we aim at a theory of reference *in natural language*. A further question is also why these constraints, and not others, should apply: why is locality such a pervasive condition over dependencies? In our opinion, the answer lies on the integration of linguistic inquiry to wider physical inquiry, insofar as language is a system within the physical world. This topic, relevant though it is here, has been dealt with in previous works, and we will not get into it here. We would, however, like to call attention to the fact that a theory of semantics in natural language cannot be isolated substantively (and should not be methodologically isolated either), if language is given mental entity at some level. Our proposal, which integrates the levels of syntax, semantics, phonology, and pragmatics, is a step towards a holistic theory (which in itself represents an advantage over orthodox minimalist accounts, which tend to focus on feature-triggered operations with little or no reference to their nature, or the semantic contribution of syntactic operations), but by no means the only logically consistent one. In a word, we aim at building *an* alternative, not at claiming that the present proposal is *the* theory to adopt. Therefore, it surely overlaps with CBT and other proposals in some respects, but, crucially, aims to take what we consider to be the best of each.

4. Conclusion

In the present paper we have argued that materialization is a function of syntactic-semantic construal, with focus on referential elements following the typology established by CBT. Our inquiry has led us to revisit CBT, both their elements and their distributional constraints: the main idea of the paper is that purely syntactic approaches are necessarily insufficient, an interface approach having emerged as the best option left. Our proposal also implies a radical simplification of the mental lexicon, from containing fully-fledged lexical items in the strongest lexicalist

²⁴ The conditions for binding, which we have formalized following Higginbotham (2009), have been also formulated informally within the French relevance tradition. See, for example, Sthioul (2000: 64). In any case, those conditions have been formulated with a specific morphological tense in mind (particularly the imperfective past), whereas we aim at a more syntactic-semantic foundation for our constraints.

proposals; and roots, categorizers, functional elements, and inner morphemes, as in Distributed Morphology, to a three-element LEX: Δ variables, Γ variables, and procedural elements. Categories, interpretations, local domains, and so on emerge *at the LF interface*, as the result of local dependencies between lexical *tokens* and procedural elements, locality being defined as in RMM. It is crucial to our proposal that interfaces are *not transparent*, but the derivational procedure must be *context sensitive* (contrarily to the context-free Merge algorithm) in the sense of Relevance theory. Non-transparent interfaces imply derivational entropy, insofar as part of the information is lost in transduction, even if only format (consider Spell-Out as dynamic Markovization of non-Markovian structure, there we have an essentially entropic process). The revisited binding proposal, as we have tried to show, has potential for applicability in both the nominal and verbal domains, pending much empirical research that will no doubt force us to polish the proposal. This does not imply that the insights and empirical predictions of CBT are to be fully abandoned, for it made impressive progress within GB, but we aim to incorporate its empirical adequacy, when successful, into a simpler theory which resorts to less substantive elements and operations (thus, ‘more minimalist’), and explicitly focused on the interaction between syntax and the external systems which impose restrictions over generated objects, evaluating those objects in a very local fashion. For the time being, we think an interface approach that links the linguistic computational system with the two (computational) interfaces in the explanation of linguistic phenomena (without focusing on only one of the components) is the way to go, if explanatory adequacy is the goal of generative linguistics.

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