

Levels of semantic representation: where lexicon and grammar meet¹

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0. Introduction

This paper presents an overview of the Lexical Constructional Model (LCM)². The LCM offers an account for understanding the relationship between lexical and syntactic meaning. Our approach has a functional and cognitive orientation and constitutes an attempt to reconcile a number of relevant theoretical and methodological assumptions from functional projectionist theories and constructional approaches to linguistic description and explanation. Thus, the LCM combines insights from two linguistic frameworks: Role and Reference Grammar (RRG), as developed in Van Valin and La Polla (1997) and Van Valin (2005), offers the functional face of the model, while Goldberg (1995, 1998, 2002, 2005) and related work (e.g. Michaelis, 2003) is the basis for the constructional orientation.

As is widely known, one of the points of divergence between functional and constructional models concerns the place where grammar meets the lexicon. Functional approaches maintain a division between lexicon and grammar, since it is claimed that morphosyntactic structure can be predicted from the information coded in a lexical representation together with a set of linking rules. Figure 1 illustrates the form of a linking algorithm within the premises of a functional projectionist theory like RRG. Note that the syntactic and the semantic component are conceived as two different modules that connect up via a bidirectional linking algorithm, that is, an algorithm that works from the semantics to the syntax and viceversa.

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² Most of the theoretical issues covered in this paper have extensively been developed elsewhere in previous studies (e.g. Ruiz de Mendoza and Mairal, 2006, in press a, b; Ruiz de Mendoza, 1998, 2000, 2005; Mairal, 2004, 2005, 2006; Mairal and Faber, 2005). We refer the reader to these studies and the references therein for a more exhaustive description of the topics discussed here. It is important to note that the LCM also constitutes the lexicological apparatus of a dictionary of constructions that is in the process of compilation.

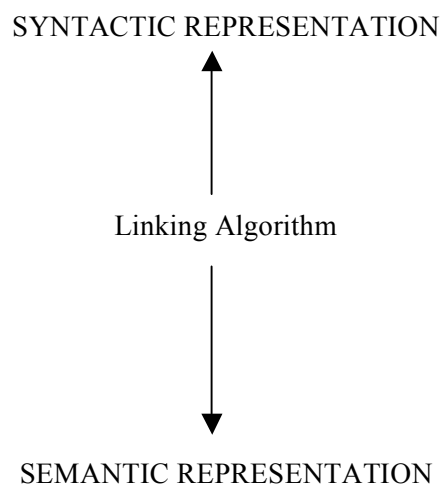


Figure 1: A simplified representation of the architecture of RRG (cf. Van Valin, 2005)

In contrast, Cognitive Linguistics (CL), in general, and Construction Grammar (CG) in particular, claims that lexicon and grammar form a continuum and that there is no need to postulate linking rules or the like (Langacker, 2005). In fact, the set of all form-meaning pairings at all levels of linguistic description is generally known as the *constructicon*, which includes lexical specifications (cf. Croft & Cruse, 2004). Then, a number of principles are stipulated, such as the well-known *Override Principle*, as described by Michaelis (2003), according to which the meaning of lexical items conforms to the meaning of the higher-level constructions in which they take part. Principles like this are postulated with a view to accounting for the unification of a verbal lexical entry and a linking construction. As a general rule, construction-based approaches reject the notion of projection and its associated inventory of linking rules on the grounds that there is no psychological and conceptual evidence that supports such a methodological procedure.

In our view, there are weaknesses in both approaches. On the one hand, functional projectionist theories ignore the unquestionable theoretical weight of constructions in predicting morphosyntactic structure, an issue that undermines a theory of linking. This point is illustrated by (1) below, where there is one argument, the PP, which is not strictly derivable from the argument structure of the predicate *scorn*. This means that this argument is a contribution of the linking construction (in this case the *caused-motion* construction), in which this predicate participates (see section 4 for a more detailed analysis of the construction). The same can be said of (2) and (3) where the predicates *save* and *imagine* add an argument to their original semantic representation, which explains why these predicates occur within the context of the *caused-motion*, *resultative*, and *way* constructions, respectively:

- (1) They scorned him into a depression.
- (2) If time is money, then save yourself rich at Snyder's (taken from Michaelis, 2003:7).
- (3) I cannot inhabit his mind nor even imagine my way through the dark labyrinth of its distortion (taken from Goldberg, 1995:10)

On the other hand, construction-based approaches have not developed the set of constraints that regulate why a given construction can unify with a given lexical entry,

an issue which must be dealt with somewhere in the theory (cf. Nuyts, 2005). For example, if we consider (4), (5), and (6), we need to specify what type of element is involved in the argument structure of *cut* and *break* which allows the middle construction to be possible, and we need to determine what is missing in (6) which blocks the very same construction. Continuing with this line of argumentation, it would be necessary to find out why *cut* and *destroy* cannot participate in the causative / inchoative alternation, while this is not the case with *break*. Moreover, we would like to determine what constraints explain why certain verbs, which apparently have the same *Aktionsart*³ representation (most of the examples in (7) are activity predicates), can occur in a caused motion construction, while others block out this pattern, as evidenced in (7b), (7c) and (7d):

- (4) a. The bread cuts easily.
b. * The bread cut.
- (5) a. We broke the window
b. The window broke
c. The window breaks easily
- (6) a. We destroyed the building.
b. * The building destroyed.
c. *The building destroys easily.
- (7) a. The audience laughed him out of the room.
b. * They ate him out of the room.
c. * They described him out of the room.
d. * Peter shivered Mary into the room.

Within the broader context of a functional and cognitive paradigm, the LCM provides an alternative to the relationship between lexicon and grammar and offers a framework which bridges the theoretical gap between projectionist and construction-based approaches by developing an inventory of constraints that simulate the role of interface (or linking rules) on the one hand, and by vindicating the role of constructions as a crucial part in the semantic representation of the theory. The rest of the present article is organized as follows: section 1 offers a brief discussion of the architecture of the model; section 2 concentrates on the two key representational constructs, that is, lexical and constructional templates; section 3 discusses the process of unification in terms of both internal and external constraints; finally, section 4 discusses the caused-motion construction from the point of view of our proposed framework.

1. The architecture of the LCM

As mentioned above, the LCM is intended to provide an explanatorily adequate framework that spells out the relationship between lexicon and grammar. In this connection, we make the following two claims (i) an account of the syntax-semantics interface in projectionist terms is insufficient to explain the multiple cases of argument realization where the role of constructions is undeniable; (ii) the unification of the argument structure of a predicate and a linking construction should be explicitly

³ See section 2 for an overview of *Aktionsart* distinctions in RRG.

specified in the grammar and be regulated by clear and explanatory constraints, an issue which, to the best of our knowledge, has not been extensively treated within the circles of CG. Figure 1 is a graphic illustration of the model:

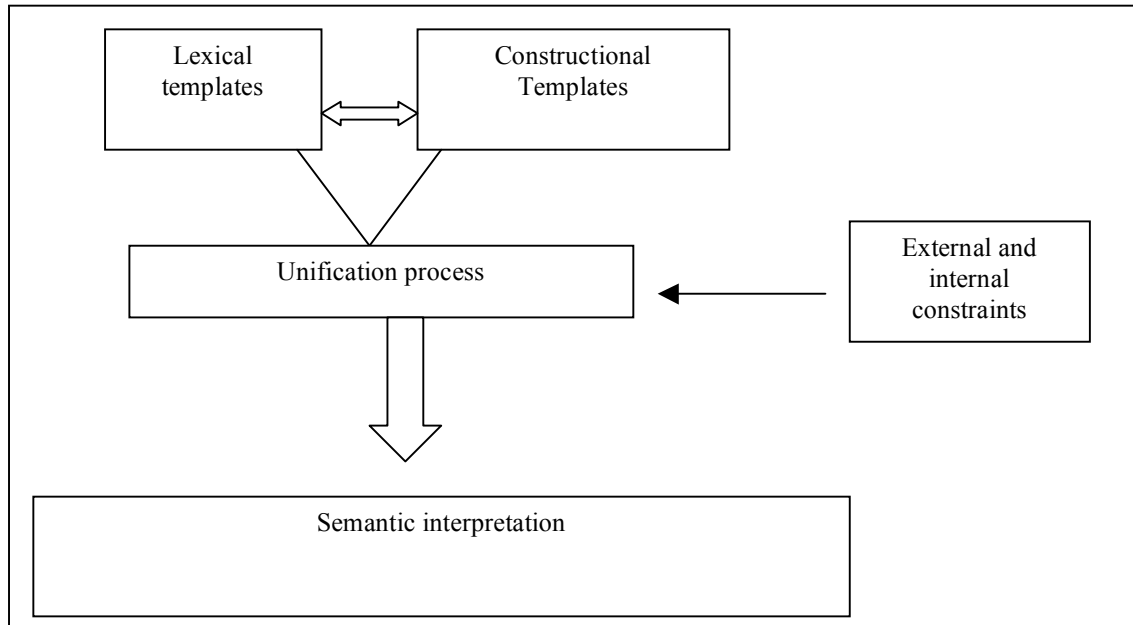


Figure 1. The Lexical Constructional Model

Semantic interpretation is obtained by the unification of a *lexical template* (i.e. a low-level semantic representation of the syntactically relevant content of a predicate) and a *constructional template* (i.e. a high-level or abstract semantic representation of syntactically relevant meaning elements abstracted away from multiple lower-level representations). We shall discuss these two essential notions in greater detail section 2 below. This unification process is in turn regulated by a number of internal and external constraints. While internal constraints refer to the metalinguistic units encoded in a lexical representation, external constraints invoke higher conceptual and cognitive mechanisms like high-level metaphorical and metonymic mappings. The basic idea is that constructional templates “coerce” lexical templates as a consequence of a more general cognitive principle whereby higher-level structures invariably take in lower-level structures (cf. Ruiz de Mendoza and Díez, 2002). Thus, when a low-level frame and an image schema interact, the frame elements become part of the image schema. Lexical templates are in fact lower-level (or lexical) constructions that can be fused into higher-level characterizations such as the caused-motion, the resultative, or the benefactive constructions. Since the formal apparatus of lexical templates shares with higher-level constructions all elements excepting those that are specific to a lower-level class, absorption of a lexical template by a construction becomes a straightforward, redundancy-free process. This kind of formulation captures relevant features that lexical template representations share with constructional representations, which makes our description fully at home with the idea of a lexical-constructional continuum, an issue which has been a source of dispute between projectionist and construction-based approaches.

In the remainder of this article, we will discuss the central modules of the new paradigm.

2. The anatomy of the lexicon

The model we are developing includes two levels of semantic representation in the lexicon: lexical templates and constructional templates. Since lexical templates are enriched semantic representations of the logical structures proposed in RRG, we think that at this stage it should be appropriate to briefly review what a logical structure is within RRG before getting into the exact details of a lexical template.

RRG uses a decompositional system for representing the semantic structure and argument structure of verbs and other predicates (their Logical Structure, LS). The verb class adscription system is based on the *Aktionsart* distinctions proposed in Vendler (1967), and the decompositional system is a variant of the one proposed in Dowty (1979). Verb classes are divided into *states*, *activities*, *achievements*, and *accomplishments* together with their corresponding causatives. States and activities are primitives, whereas accomplishments and achievements consist of either a state or activity predicate plus a BECOME and an INGR operator. The inventory of RRG logical structures is shown below⁴

Verb Class	Logical Structure
State	predicate' (x) or (x,y)
Activity	do' (x, [predicate' (x) or (x,y)])
Achievement	INGR predicate' (x) or (x,y), <i>or</i> INGR do' (x, [predicate' (x) or (x,y)])
Accomplishment	BECOME predicate' (x) or (x,y), <i>or</i> BECOME do' (x, [predicate' (x) or (x,y)])
Active accomplishment	do' (x, [predicate' ₁ (x, (y))]) & BECOME predicate' ₂ (z,x) or (y)
Causative	α CAUSES β where α, β are LS of any type

Table 1: Inventory of RRG logical structures

The following examples illustrate instantiations of an accomplishment (8), an activity (9), a state (10), a causative accomplishment (11), and an active accomplishment (12)⁵:

- (8) *learn*: BECOME **know'** (x, y)
- (9) *walk* **do'** (x, [**walk'** (x)])
- (10) *own* **have'** (x, y)

⁴ In Van Valin (2005: chapter 2) the structure for active accomplishment predicates, such as consumption verbs, has changed the operator BECOME for INGR. This new characterization captures the fact that the activity subevent in the representation ([**do'** (x,...)]) involves duration, whereas the second telic subevent does not: INGR is an operator that stands for punctual states of affairs, while BECOME marks non-punctual states of affairs.

⁵ These representations are taken from Van Valin and LaPolla (1997: chapter 4)

(11) *give* [**do'** (x, \emptyset)] CAUSE [BECOME have' (y, z)]

(12) *eat*: **do'** (x,[**eat'** (x,y)]) & BECOME **consumed'** (y)

As has been discussed in recent work (cf. Mairal and Faber, 2002, 2005), this system of lexical representations has the following shortcomings:

1. Logical structures need an enhanced semantic component since only those aspects of the meaning of a word which are grammatically relevant are captured, and no mention is made of those pragmatic and semantic parameters that also form part of the meaning of a word.
2. From the preceding point it follows that a more refined system of semantic decomposition has to be formulated. For example, if we consider the representation for *sing* and *show* it seems as if (14) includes a more elaborate semantic decomposition than (13). Thus, we need to establish where the chain of semantic decomposition actually ends.

i. (13) *sing* **do'** (x, [**sing'** (x)])

ii. (14) *show*: [**do'** (x, \emptyset)] CAUSE [BECOME [**see'** (y, z)]]

3. The nature of the primitives involved is unclear and inconsistent. If we want to provide typologically valid representations, we should be able to develop a universal metalanguage which allows us to represent a given predicate in such diverse languages as Spanish, Amele, Japanese, and Korean, to give just a few examples. This theoretical stance avoids the problem of using English to describe predicates in languages different from English.
4. As shown above, there is no way to account for arguments that are not strictly derivable from the meaning of a predicate. The role of constructions has been relegated to the syntactic phase of the algorithm and nothing has been said of their semantic contribution.
5. There is no place in the account for linguistic expressions based on metaphor, metonymy, and image schemas. In connection with this, we believe that some important meaning generalizations pertaining to the cognitive grounding of grammatical structure are missing, an issue to which we will return in section 3.2.

In our view, the notion of lexical template addresses the problems listed above in a satisfactory way. More specifically, since lexical templates are based on a universal metalanguage, we claim that they are capable of providing typologically valid lexical representations.

2.1. Lexical templates

Lexical templates grow out as an attempt to capture and formalize the set of semantic and pragmatic parameters that are part of the meaning of a word. This involves a

reinforcement of the inventory of logical structures, which, as shown above, only capture those aspects of the meaning of a word that are grammatically relevant. For example, if we compare the representation for the predicates *eat* and *devour*, their logical structure would be the same, that of an active accomplishment, as shown in (12), although their meaning is different since *devour* encodes specific pragmatic and semantic parameters that differentiate it from *eat* and other predicates within the same hierarchy.

Moreover, we want lexical templates to be typologically adequate, which calls for the development of a universal semantic metalanguage that makes sense if we want to define a predicate –of whatever kind- in languages other than English. For example, if we want to account for the properties of *recordar* in Spanish, there is no need to use *remember* as part of the lexical representation of this predicate but *recordar*. This point, which apparently sounds a bit bizarre, is not an easy one since people working in different languages do not know what language to use when describing the lexical properties of a predicate. RRG is very unclear in this respect and everything seems to suggest that English should function as the metalanguage, a highly questionable decision. Then, we need to come up with an inventory of primes that allow us to define a predicate on the basis of typologically valid linguistic units.

Finally, we need to produce a robust formalism that meets the preceding requisites, that is, an enriched system of semantic representation which functions cross-linguistically. In connection with this, Mairal and Faber (2005) have outlined the essential features of this universal metalanguage. They distinguish the following two components: (i) the semantic component, which provides a set of primes, (ii) the syntactic component, which is concerned with the set of functions that express how primes can actually be combined; (iii) the design of the formalism.

A) The semantic component

An important thesis behind the development of a semantic metalanguage rests upon the assumption that smaller meaning units must exist at some level to encode conceptual content. Whatever the format of these units is (e.g. whether they are conceived as natural language phrases or as abstract conceptual features), we want to produce an inventory of primes that is systematic, finite and internally consistent. For this reason, drawing on previous lexicographic work in Faber and Mairal (1999)⁶, we have defined the architecture of the verbal system on the basis of a number of domains. Each lexical domain is defined by a superordinate term which is the product of extensive factorization of meaning definitions. The resulting classes are the following:

Lexical domain	Nuclear term
EXISTENCE	be/happen
CHANGE	become
POSSESSION	have
SPEECH	say
EMOTION	feel
ACTION	do, make
COGNITION	know, think

⁶ This work is in turn a development of the seminal ideas put forward by the late Martín Mingorance (1984, 1990, 1995), where the onomasiological description of lexical items in classes is a function of their semasiological characterization in terms of common meaning components.

MOVEMENT	move (go/come)
PHYSICAL PERCEPTION	see / hear / taste / smell / touch
MANIPULATION	use

What is important is that each of these superordinate terms can in fact be used for the formulation of the meaning of more specific lexical items. For example, we can use *know*, which is one of the two superordinate terms for the domain of COGNITION, to define a number of hyponyms like *learn*, *study*, *understand*, *fathom*, *grasp*, among others. In fact, we could go a step forward and affirm that the superordinate terms for each basic conceptual category can be regarded as possible candidates for the inventory of more basic terms or primitives. Interestingly enough, this proposal coincides to a great extent with that of Wierzbicka's *Natural Semantic Metalanguage* (NSM) research program, which has been shown to be valid for over a hundred languages (cf. Wierzbicka, 1989, 1987, 1996, 1999; Goddard and Wierzbicka, 2002). For this reason, as a first approximation, we have been using these primes for the description of the verbal lexicon.⁷

B) The syntactic component

Once we have formulated an inventory of primes we need to find out how they combine so that we can define the whole set of predicates that converge within a lexical class, i.e. we need to specify the syntax of the metalanguage. So, if we want to represent the meaning of *order*, *remember*, *watch*, *love*, we will use the primes that define each of the lexical domains, that is, speech, cognition, visual perception, and feeling, plus a mechanism that allows us to combine the set of primes to arrive at the more specific lexical items such as those just mentioned. On the other hand, Wierzbicka's *Natural Semantic Metalanguage* formulates language definitions that are not useful for our purposes since they are not formalized in way that allows us to account for the motivation of syntactic expression, including lexical-constructional subsumption processes, which are central to the LCM⁸. Instead, we propose a set of operators that are based on the notion of lexical function as propounded in Mel'cuk's *Explanatory and Combinatorial Lexicology* (ECL) (cf. Mel'cuk, 1989; Mel'cuk et al., 1995; Mel'cuk and Wanner, 1996; Alonso Ramos, 2002)⁹. It is important to note that these lexical functions have also been shown to have a universal status (cf. Mel'cuk, 1989), something which is in accord with our aim of providing typologically valid representations.

⁷ We are aware that we also need to expand this research to other categories (e.g. nouns, adjectives etc.) so that the resulting inventory of primes is more complete and functions across the different grammatical categories. However, this is an aspect of the theory that has not yet been addressed.

⁸ For the sake of illustration, consider the following definition (so-called explication in NSM), for the verb *lie*, drawn from Wierzbicka (1990):

X lied to Y =
 X said something to Y
 X knew that it was not true
 X said it because X wanted Y to think that it was true
 people think it is bad if someone does something like this.

The explication is based on semantic primes like 'say', 'something', 'not', 'true', 'people', 'think', 'want', 'bad', etc., which are valid categories across languages.

⁹ We refer the reader to the website of the project for an updated account of the most recent work: <http://www.fas.umontreal.ca/ling/olst/>

According to Mel'cuk *et al* (1995: 126-127), a lexical function (LF) is written as: $f(x) = y$, where f represents the function, x , the argument, and y , the value expressed by the function when applied to a given argument. The meaning associated with an LF is abstract and general and can produce a relatively high number of values. For example, **Magn** is a function that expresses intensification. It can be applied to different lexical units thus yielding a high set of values, as exemplified below for English and Spanish:

Magn	(Engl. smoker)	=	heavy
Magn	(Engl. bachelor)	=	confirmed
Magn	(Sp. error)	=	craso
Magn	(Sp. llorar)	=	llorar como una Magdalena

Here are some more examples of the lexical functions **Able** ('such that someone or something can be /do/ have'), **Result** (the state or endpoint of a process) and **Mult** ('a set of')¹⁰:

Able ₁	(Sp. envidia)	=	envidioso
Able ₂	(Sp. envidia)	=	envidiable
Result	(Sp. aprender)	=	saber
Mult	(Sp. perro)	=	jauría

(Mel'cuk *et al*, 1995: 126-127; Alonso Ramos, 2005).

Most of these functions refer to the combinatorial potential of lexical items. A set of approximately sixty standard lexical functions divided into paradigmatic and syntagmatic functions have been identified (Mel'cuk 1998; Mel'cuk *et al*. 1995; Mel'cuk and Wanner 1996). As shall be seen below, unlike Mel'cuk's lexical functions, we use lexical functions vertically instead of horizontally.

C) The formalism

At this stage, we have an inventory of primes and a catalogue of lexical functions that have cross-linguistic validity. Now, a further issue that arises concerns the development of a formalized system for lexical representation based on this new metalanguage. In connection with this, we believe that logical structures can be maintained and be enriched by adding a new semantic component as shown in the following schema:

[semantic representation] + logical structure = lexical entry

The semantic module is encoded by means of lexical functions that are essentially paradigmatic and captures those pragmatic and semantic parameters that are idiosyncratic to the meaning of a word and also serve to distinguish one word off from others within the same lexical hierarchy. For example, let us consider the following predicates:

confuse to cause sb not to understand sth.

puzzle to confuse sb, causing them to think for a long time.

confound to confuse sb causing them to feel surprise and doubt.

¹⁰ For a more detailed description of the whole set of lexical functions, we refer the reader to the work done by Margarita Alonso Ramos, from where these examples have been extracted.

perplex to confuse sb, causing them to feel worry.

It is clear that, although they all share the same semantic scenario (e.g. *to cause sb not to understand sth*) the three hyponyms (*puzzle*, *confound*, and *perplex*) encode different distinguishing properties that allow us to differentiate one from the rest; in the case of *perplex*, there is a feeling of worry, which is not the case with *confound* and *puzzle*. A similar argument could be used to define *confound*, which encodes a feeling of surprise and doubt, in contrast with *puzzle*, which focalizes the temporal dimension of continuity. In our model, all these semantic and pragmatic parameters are encoded by means of lexical functions in a separate semantic module that complements the corresponding logical structure.

The second module follows the orthodox practice of RRG as described in section 2. This module includes a description of the *Aktionsart* properties that are characteristic of a given predicate together with the set of variables that have a syntactic impact. In order to mark the difference between the properties of the two modules we will be using two types of variables: *internal* and *external* variables. Internal variables –which are marked with numerical subscripts– refer to the semantic parameters of a predicate, while the latter –which are represented by Roman characters– capture syntactically relevant meaning aspects¹¹. An important feature is that all units involved in the lexical representation of the predicate must have a universal status, that is, all the units must be part of the metalanguage. Let us comment on the representation of several lexical entries:

Grasp: [MagnObstr & Culm₁₂[_{ALL}]] **know'** (x, y)

The entry for *grasp* has two parts: (i) the semantic component in brackets; (ii) the representation of the logical structure. In this case, this predicate is represented by a state logical structure which takes **know'** as a primitive and has two arguments (x, y). This logical structure is in turn modified by a lexical function (or operator) MagnObstr, which specifies the large degree of difficulty involved in carrying out the action. The other lexical function, Culm, captures the end-point of knowing something (which is understanding). Note that *grasp* is a hyponym of *understand* and consequently inherits all the semantic properties of the superordinate. ALL is another lexical function -of the kind postulated by Mel'cuk- that falls within the scope of the internal variables. In our proposal, this lexical function refers to the propositional content of the object of apprehension.

Realize: [Instr (see)₁₂Loc_{in} (body_part: mind) & Culm₁₂[_{ALL}]] **know'** (x, y)
where x = 1 and y = 2

The lexical entry for *realize* has a state logical structure which is inherited from the superordinate term (*understand*, Culm₁₂[_{ALL}]) and a semantic description of the idiosyncratic properties of this predicate. This semantic part, INSTR (see)₁₂LOC_{in} (BODY_PART: mind) [understand], is interpreted as follows: the cognizer (arg1) comes to

¹¹ The formalism we use is an adaptation to our framework of the one in Van Valin and LaPolla (1997: 117), who mark external variables with Roman characters and internal variables with Greek letters.

know or understand a mental percept (arg2). This is done by *seeing* (semantic primitive) it in his/her *mind* conceptualized as a location (LOC_{in}). The mind is represented as an abstract body_part, which means it is in a partitive relationship to *body*. Note that this predicate inherits the properties of its immediate superordinate, a feature that we have marked with the symbol &.

Interpret: [Instr (Caus (have))₁₂ ((other) ALL)₃ & Culm₁₂[ALL]] **know'** (x, y)

In the case of *interpret* we also have a state in the logical structure plus a semantic description, Instr (Caus (have))₁₂ ((other) ALL)₃ (*understand*, Culm₁₂[ALL]). The cognizer (arg1) understands a mental percept (arg2) causing it (CAUS) to *have* (semantic primitive) *another* (semantic primitive) meaning.

Reminisce: [Involv(say)₁₂Sympt₁ (feeling_type: pleasure)] **think'** (x, y)

The predicate *reminisce* inherits the properties of *remember* and thus encodes a state logical structure, which is in turn modified by a semantic representation with the following format: Involv(say)₁₂Sympt₁ (feeling_type: pleasure) [remember]. *Reminisce* has the same basic meaning as *remember*, but involves (Involv) a cognizer (arg1) saying (*say*) things about it (arg2). This subactivity produces physical symptoms or feelings (SYMPT) in the cognizer/experiencer, which come from feeling_type: pleasure.

Consider: [LOC_{in}^{TEMP↔}₁₂ CONT] **think'** (x, y)

The representation for *consider* includes a state logical structure and a semantic representation LOC_{in}^{TEMP↔}₁₂ CONT [think], which is interpreted as follows: a cognizer (arg1) thinks about a mental percept (arg2) located in the present (LOC_{in}^{TEMP↔}) for a long time (CONT).

Study: [PurpMagn(know)₁₂ & Loc_{in}^{temp↔}₁₂ Cont] **think'** (x, y)

As in the previous examples, the state logical structure for *study* is enriched by a semantic representation PURPMAGN(know)₁₂ [consider1]. In *study*, a cognizer (arg1) thinks about a mental percept (arg2) located in the present. PURP codifies the purpose of the action, which is for the cognizer to *know* (semantic primitive) more (MAGN) about the mental percept (arg2).

2.2. Constructional templates

Constructional templates are inspired in the work of construction-based approaches like Goldberg (1995, 2005)¹². A grammar consists of an inventory of constructions, which

¹² Note that within construction grammar there is a cluster of related models. These models encompass (i) monotonic (unification-based) variants (Kay and Fillmore, 1999, Fillmore *et al.*, to appear), which are gradually coming closer to a formalist model along the lines of *Head Driven Phrase Structure Grammar*, and (ii) non-monotonic variants influenced by Cognitive Linguistics. The latter include *Cognitive*

are in turn defined as form meaning pairings. Goldberg (1995:3-4) identifies the following inventory:

Type of construction	Semantic representation
Ditransitive <i>Pat sent Hill a fax</i>	X CAUSES Y TO HAVE Z
Caused motion <i>Pat sneezed the napkin off the table</i>	X CAUSES Y TO MOVE TO Z
Resultative <i>She kissed him unconscious</i>	X CAUSES Y TO BECOME Z
Intransitive <i>The fly buzzed into the room</i>	X MOVES Y
Conative <i>Sam kicked at Bill</i>	X DIRECTS ACTION AT Y

Constructional templates, such as those discussed in Goldberg, are in turn linked to lexical entries, each of which is elaborated on the basis of Fillmore's *Frame Semantics*. A frame, like a lexical template, describes situation types (e.g. buying and selling, eating, etc.)¹³, and includes a very rich semantic description of a lexical item by integrating what they call core and non-core elements, which coincide to a large extent with our distinction between external and internal variables. The purpose of constructing rich semantic descriptions by integrating central and peripheral elements within a semantic scenario is shared by both frames and templates. The difference is that lexical templates include a much more formalized representation, something which brings them closer to the notational device used for constructional templates. In a way we could say that lexical and constructional templates have the same metalanguage, in such a way that unification becomes a more straightforward process, which is not the case with the notation used in frame semantics. For the sake of illustration, consider our proposed format of the caused-motion construction:

do' (x, [**pred'** (x, y)]) CAUSE [BECOME NOT **be-in'** (y,z)]

pred' (x, y) CAUSE [BECOME NOT **be-in'** (y,z)]

Note that what is characteristic of this construction is that there is an induced phenomenon which causes a change of location. The second part is a recurrent pattern (e.g. BECOME NOT **be-in'** (y, z)]) in every representation of the constructional template, while the first part varies between an activity and a state template:

do' (x, [**pred'** (x, y)])

Grammar (Langacker, 1987, 1991, 2005), the Goldbergian version of *Construction Grammar* (Goldberg, 1995, 1998, 2003, 2005), which, in turn, owes its greatest debts to Lakoff (1987) and Fillmore (1987), and more recently Croft's (2001) *Radical Construction Grammar*.

¹³ Instead of postulating situation types, our approach divides a lexical domain into a number of lexical subdomains which focalize different semantic and pragmatic phases: for example, 'to cause sb to understand sth', 'to think something is true' are just some of the lexical subdomains that pervade the domain of cognition. We refer the reader to Faber and Mairal (1999) for a classification of the architecture of the English lexicon in terms of lexical domains and subdomains. The crucial issue is that frames and lexical templates are different ways of capturing the elements of semantic / pragmatic scenarios.

predicate, e.g. the middle construction, the causative / inchoative, the characteristic property of instrument alternation etc. are some illustrative cases¹⁵:

- Middle construction:
 - (15) This duck kills easily.
 - (16) The alloy is flexible and bends easily.
 - (17) These buns bake beautifully.
- Causative / inchoative construction
 - (18) The balloon inflated quite rapidly.
 - (19) It defrosted in cold water.
 - (20) Grass blackened after the fire.
 - (21) His eyes yellowed with exhaustion and resignation.
- Characteristic property of instrument alternation
 - (22) This drawknife cuts well.
 - (23) It's a hammer and it hammers well, but it will not teach you to be a carpenter.
- Subject instrument
 - (24) The saw cut the wooden leg of the table.
 - (25) A six-shooter killed the sheriff.

B) **Subcategorical conversion**: The semantic features encoded in the argument structure of a predicate do not coincide with those of the linking construction. This includes those morphosyntactic patterns that are not strictly derivable from the semantics of the predicate but are a contribution of the construction. We are referring to cases of subcategorical conversion. Consider the following examples:

- The caused-motion construction
 - (26) My wife yelled me out of the house.
 - (27) He loved him into death.
 - (28) He listened me into the room.
- The resultative construction
 - (29) He hammered the metal flat.
 - (30) He punched my stomach numb.
 - (31) She screamed my face red.

¹⁵ Some of the examples that illustrate the constructions that follow are inspired in or taken from Levin (1993).

(32) I broke the glass into four sections.

- The reaction-object construction¹⁶

(33) She mumbled her adoration.

(34) Sandra beamed a cheerful welcome.

(35) Paula smiled her thanks.

Furthermore, there are some cases that encapsulate a non-propositional interpretation, which forms the basis of very well established metaphors and metonymies. Consider the following examples:

(36) He dreamed he spoke an angle into existence.

(37) Another blog twinkles into existence.

(38) The boss scorned the employee into a depression.

(39) The man ignored the lady into oblivion.

Now, a further issue is to stipulate the specific mechanisms that explain when these two processes occur, which means formulating the exact conditions that allow the generation of grammatically acceptable structures and also explains the grammatical oddity of certain morphosyntactic patterns. Thus, we aim to come to terms with a number of constraints that are able to explain the generation of grammatical structures and also to block out grammatically deviant patterns.

3. Semantic interpretation in the LCM

As advanced above (cf. section 1), semantic interpretation (or meaning construction) is obtained through the unification of a lexical template and a constructional template, a process that is in turn regulated by an inventory of lexical unification constraints. Two types of constraints are noted: *internal* and *external*. Internal constraints are formulated in terms of the metalinguistic units that form part of a lexical template, while external constraints include a number of cognitive and conceptual mechanisms like high-level metaphorical and metonymic mappings (Ruiz de Mendoza and Mairal, 2005). These two types of constraints have been treated in terms of linking rules (as has been the case in most projectionist accounts) or else in terms of ‘coercion’ and its associated principle the *Override Principle*, according to which the meaning of a lexical item conforms to the meaning of the structure in which it is embedded. However, both accounts do not manage to provide a complete description of why certain predicates generate certain patterns while others cannot. That is, we need to postulate more explanatory mechanisms that offer a more profound and specific account of the motivations that underlie unification.

In what follows, we shall discuss an illustrative sample of both internal and external constraints.

3.1. A brief overview of internal constraints

¹⁶ These examples are taken from Levin (1993).

Internal constraints stipulate the conditions under which lexical and constructional templates can unify by focusing on the internal semantic make up encoded in the two types of templates. Let us discuss some relevant possibilities¹⁷.

The most basic case of unification is that of ‘full matching’; there is a perfect matching between the lexical and the constructional template in such a way that the number of variables, events, subevents and operators involved are easily identified. This constraint is inspired in Van Valin’s (2005:101) ‘Completeness Constraint’, which stipulates that all of the arguments specified in a semantic representation must have a correlate in the syntax and viceversa. For example, if we consider the lexical representation for the predicate *kill* and the transitive constructional template we observe that all of the arguments, events and operators in the lexical template have a direct, clear correlate in the transitive constructional template. This allows transitive expressions like the following to occur:

- (40) Peter killed the worm.
 (41) John killed the man with a gun.

If we compare both structures, there is an effectual action broken down into two subevents, which are in turn modified by two variables (x and z) and an optional one (y) which is that of the instrument. This also explains the occurrence of this predicate within the context of the Instrument Subject alternation, where the instrument becomes the subject (e.g. *The bomb killed the spy*).

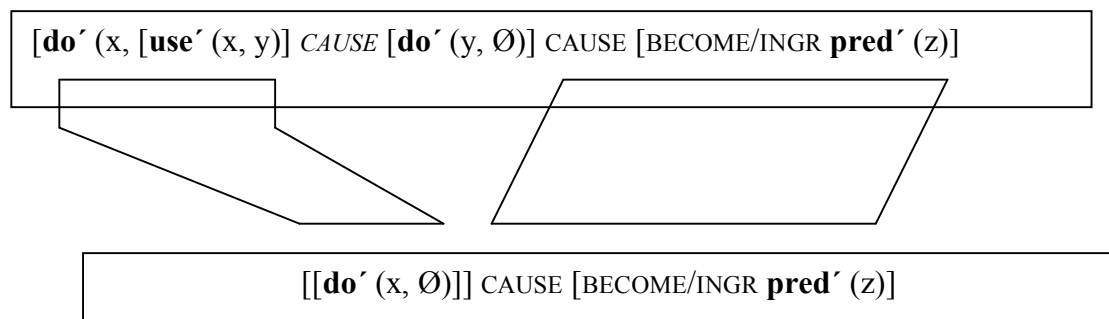


Figure 2: Unification of a lexical template and a transitive constructional template

Internal constraints also refer to the nature of the primitive involved. For example, if we compare the logical structures for *break* and *destroy* as envisaged in RRG there is nothing which prevents them from participating in the causative / inchoative alternation, something which is the case with *break* verbs but grammatically odd with *destroy* as illustrated below:

- (42)
 a. $\text{do}' (x, \emptyset) \text{ CAUSE } [\text{BECOME broken } (y)]$
 b. $\text{do}' (x, \emptyset) \text{ CAUSE } [\text{BECOME destroyed } (y)]$
- (43) a. Ron broke his finger / His finger broke.
 b. Ron destroyed the building / * The building destroyed.

¹⁷ This is just a very brief sample of the entire catalogue of internal constraints. We refer the reader to Mairal (2004) for an extensive discussion of these constraints.

However, if we reformulate these representations in terms of a lexical template as in (42), we note that *destroy* contains an endpoint result expressed by a primitive, BECOME NOT **exist**', and a lexical function RealLiqu_{12} which expresses the idea that someone carries out an action such that an entity does not longer exist. This means that *destroy* verbs are not verbs of change of state but verbs of existence and therefore are incompatible with the semantics imposed by the construction itself, which only occurs with pure change of state verbs as is the case with *break*.

(44) $[\text{RealLiqu}_{12}] \text{do}' (x, 0) \text{CAUSE} [\text{BECOME NOT exist}' (y)]$

Another interesting case of internal constraint is that given by the semantics of one of the variables. For example, the middle construction imposes a constraint which concerns the affectedness of the object. This is coded in the lexical template by means of the lexical function $[\text{MagnInvolv}_{1,2}]$, which means that someone or something acts intensely on the second argument such that this is seriously affected. For example, this explains why the middle construction is possible with predicates like *scare* and *terrorize* (which focalize the affectedness of the object), while it is blocked out with, say, *hearten*, which emphasizes the manner in which the action was performed. A similar argument could be used to explain why a manner of cutting predicate like *jab* cannot occur in the resultative construction. This predicate, unlike most of the hyponyms in this lexical hierarchy, contains an internal semantic variable that encodes an iterative action which clashes with the telic nature of a resultative construction.

However, there is more than a set of internal constraints if we want to account for the unification of constructional and lexical templates. In this regard, we understand that a number of external constraints work in close cooperation with internal constraints with the aim of providing explanatorily sound theses about the (non) grammatical status of certain constructions. Within this context, we formulate a number of external constraints, which are the major concern of the following section.

3.2. Looking beyond lexical representation: the role of external constraints¹⁸

One of the criticisms that have been leveled against CL is that metaphors and metonymies seem to be unconstrained phenomena. As a response to this assumption, Lakoff (1993) formulated the *Invariance Principle*, which stipulates that the image schematic structure of the target domain of a metaphoric mapping has to be preserved in such a way that is consistent with the topological structure of the source domain. As an expansion of this principle, Ruiz de Mendoza (1998) has noted that the preservation of the image schematic or topological structure between a target and a source domain can also be extended to other generic or high-level structures. In this regard, he has formulated the *Extended Invariance Principle*, which states that the generic-level structure of a target domain has to be preserved in a way that is consistent with the corresponding structure of the source. For example, a recurrent metaphor is that of mapping animal behavior onto human behavior, which allows the use of terms like

¹⁸ For an in depth account of both metaphor and metonymy, we refer the reader to Ruiz de Mendoza and Mairal (2006b) and the references contained therein.

‘shark’ to refer to a good player that always wins the most novel given the assumption that a good player is seen as a predator that preys on inexperienced ones¹⁹.

In a complementary way, Ruiz de Mendoza and Santibáñez (2003) have formulated the *Correlation Principle*, which places constraints on metaphoric mappings on the basis of the implicational structure of the target and source elements. This means that for a metaphoric source element to qualify as the counterpart of a target domain element, the source element needs to share the relevant implicational structure of the target element. For example, it would be extremely odd to use the name of a company to refer the spouse of one of the employees, but not an employee or a chief officer. The same could be said in the context of a hospital where it is common practice for nurses to refer to their patients by their diseases (e.g. *Go see the appendicitis in room 301* which contrasts with **Go and see the newly changed sheets in room 301*).

Another relevant external constraint is provided by the *Mapping Enforcement Principle*, which ensures that no item in the source is to be discarded from a mapping system if there is a way to find a corresponding source element in the target domain. For example, expressions like *give a kick* and *give a kiss* are analyzed by Lakoff (1993) as cases of target domain overrides in the metaphor AN ACTION IS A TRANSFER OF POSSESSION. Lakoff claims that one of the elements in the source (in this case the possession element) does not have an exact counterpart in the target since the person that ‘receives’ a ‘kick’ does not actually ‘have’ the kick and consequently the possession element would have to be discarded. However, as shown in Ruiz de Mendoza and Mairal (2006b), the target of this metaphor is in turn imbued in a built-in metonymy that maps the action of kicking onto the effects of kicking, whose target corresponds to the possession element of the source. The resulting account offers perfect matches in the source: the agent is the giver, the patient is the receiver, kicking is giving and the possession of the object is mapped onto the effects of kicking, which enables us to preserve the possession element in the metaphoric source.²⁰

In sum, the Extended Invariance Principle, the Correlation Principle and the Mapping Enforcement Principle stipulate all possible correspondences between a source and a target domain and accordingly they provide a sound explanation to explain metaphors of the following type (cf. Ruiz de Mendoza and Mairal, 2006):

- (45) He talked me into it.
- (46) He drank himself into stupor.
- (47) She winked her through Picadilly.

In (45) ‘talk someone (into)’ is based on the metaphor COMMUNICATIVE ACTION IS EFFECTUAL ACTION, which licenses a subcategorical conversion process whereby the receiver of the message is seen as if directly affected by the action of talking rather than as the goal of the message. Seemingly in (46) the metaphor AN ACTIVITY IS AN (EFFECTUAL) ACCOMPLISHMENT allows us to interpret the originally intransitive predicate ‘drink’ in terms of a transitive structure of the actor-object kind (in the example, the object is reflexive). This reinterpretation is governed by

¹⁹ Note that this principle also applies to metonymy by preserving the high-level configuration of domain-internal relationships, which explains expressions like *he drank bottle after bottle*, *the buses are on strike* and rules out others like **He drank cork after cork*, **The wheels are on strike*. For a full account of this issue, we refer the reader to Ruiz de Mendoza and Mairal (2006).

²⁰ As noted above in relation to the Correlation Principle, the Mapping Enforcement Principle also works in the metonymic development of some metaphors as well as in the generation of double metonymies or what have been called metonymic chains (Barcelona, 2002:266; Ruiz de Mendoza and Díez, 2002)

the three principles discussed above. In (47) the metaphor an EXPERIENTIAL ACTION IS EFFECTUAL ACTION applies to prepositional activity predicates like *wink at* (also to *laugh at*, *listen to*, *wave at* etc.) which can be classified as experiential actions.

Moreover, the set of external constraints can also offer theoretical grounds to explain the extreme oddity of metaphors along the following lines:

(48) * I painted John out of the room

(49) * My mother dressed me into the room.

(48) could be paraphrased as ‘I caused John to go out of the room by painting an embarrassing picture of him’, thereby yielding an impossible metaphor. This metaphor does not work because it is impossible to map an effectual object (or effectee) onto the result (or scope) of an action. This incorrect mapping breaks the Correlation Principle. In much the same way, the metaphor in (49) is ruled out because the object of the predicate *dress* can never be interpreted as an experiencer, which means that the Extended Invariance Principle and the Correlation Principle are violated.

Finally, an interesting issue is to explore the grammatical grounding of both metaphor and metonymy and their associated external constraints. Very briefly, in our search for determining the conceptual and cognitive basis of grammar, we have found out that grammatical processes such as subcategorical conversion and elaboration (cf. section 2.3) are conceptually grounded in higher-level metaphorical and metonymic cognitive processes. This is in fact in line with the nature of both metonymies and metaphors. Recall that metonymies are domain-internal mappings where one of the domains involved provides a point of access to the other, which makes them especially suitable for elaboration processes to the extent that they highlight different aspects of the transitive schema. For example, if we try to explain the elaboration process whereby a causative accomplishment is reduced to an accomplishment structure, we can easily explain it in terms of the high-level metonymy PROCESS FOR ACTION²¹.

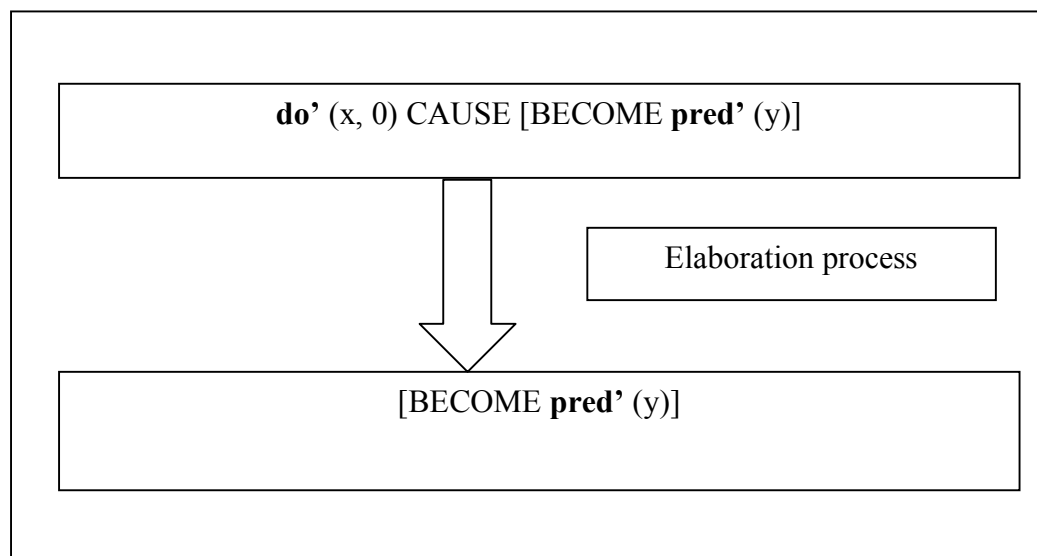


Figure 3: The lexical template of a potential causative/inchoative alternation

²¹ We refer the reader to Ruiz de Mendoza and Mairal (2006 a, b) for a full discussion of this issue.

Alternatively, metaphors, which are domain-external operations, are in accord with subcategorical conversion processes. These processes require looking beyond the lexical representation in order to account for the presence of a constituent that cannot be explained, unless an external operation between a target domain (the lexical template) and a source domain (the constructional template) is activated. This is the case of those predicates occurring within the context of a caused motion, resultative, way construction etc. The following Figure illustrates the metaphorical mapping between the lexical template and the constructional template and how this mapping is in turn regulated by the set of external constraints discussed above:

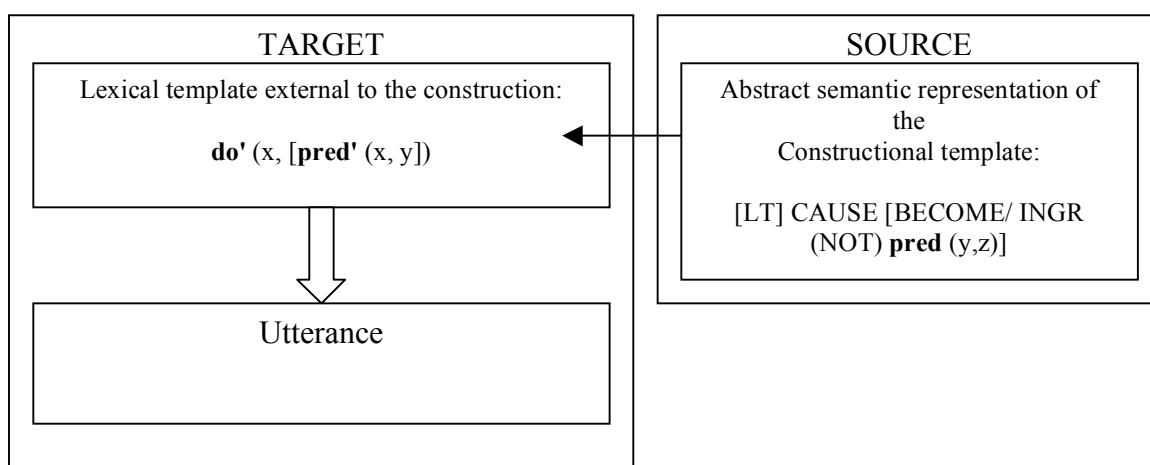


Figure 4: Unification of a lexical template with the caused motion construction

4. A case study: the caused-motion construction

This construction introduces another logical structure that focalizes the location towards which the affected entity is moving. The caused-motion construction is not a lexical property of these verbs, but comes from the semantics of the construction (cf. Goldberg, 1995), so this is a clear case of what we have called subcategorical conversion. Consider the following examples, of which (52) and (53) involve metaphorical motion:

- (50) Peter laughed John out of the room.
- (51) I was kicked out of office.
- (52) They pulled him out of a time machine.
- (53) You talked me into it

We may wonder why *laugh*, *kick*, *pull* and *talk*, which are action predicates, can participate in this construction, while this is not the case with other action predicates that seem to share the same *Aktionsart* distinctions:

- (54) * They caught him out of the park.
- (55) * They killed him out the room.

(56) * They drank him out of the room.

Moreover, a further complexity arises when we observe that this construction is also possible with purely state predicates like *love*:

(57) Mary loved Peter back into life.

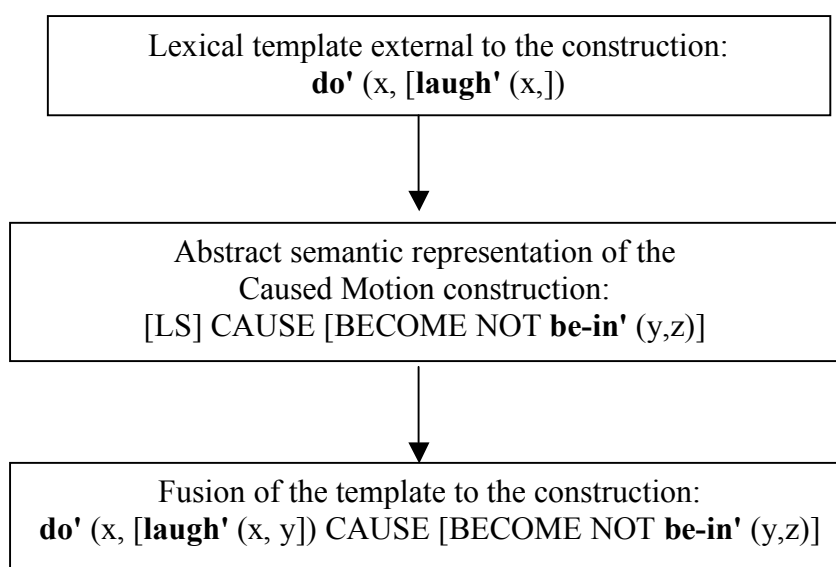
Let us then look at these two cases from the viewpoint of the framework developed in this paper. In the case of activity predicates like *laugh*, we have to reinterpret them in terms of a causative accomplishment (cf. section 2). Additionally, at least in the case of *laugh*, there is a case of subcategorical conversion from a verb with a prepositional complement (“laugh at someone”) to a purely transitive verb (“laugh someone”). We claim that this process is regulated by a high-level metaphor that we have termed EXPERIENTIAL ACTION IS EFFECTUAL ACTION, where an experiential activity (the target domain) is mapped onto an effectual action (the source domain). This proposal is in turn based on the correlation between two kinds of doer (an effector and an experiential actor) and two kinds of object (an effectee and an experiential object/goal). Then, if we look at the external constraints above, we observe that all elements in the source are mapped onto the target with the exception of the instrument; the actor is the effector since both are doers of an action; the effectee is the experiential object given that both are objects; effecting is acting; and the purpose of the experiential action is seen as the purpose of the effectual action. In this system, the instrumental role does not have a direct counterpart in the target domain and is thus discarded through the application of the Extended Invariance Principle:

(58) * They laughed him out of the room with big laughter.

(59) * John laughed him out of the room with his mouth and lips

The ungrammaticality of the following expressions shows that we cannot force an instrument into an experiential action, otherwise the generic level structure of the target would not be preserved.

Let us then see the unification of the lexical and constructional templates for the causative use of *laugh* in the case of the caused-motion construction.



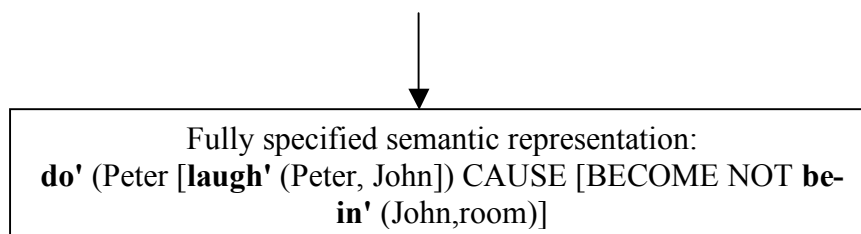


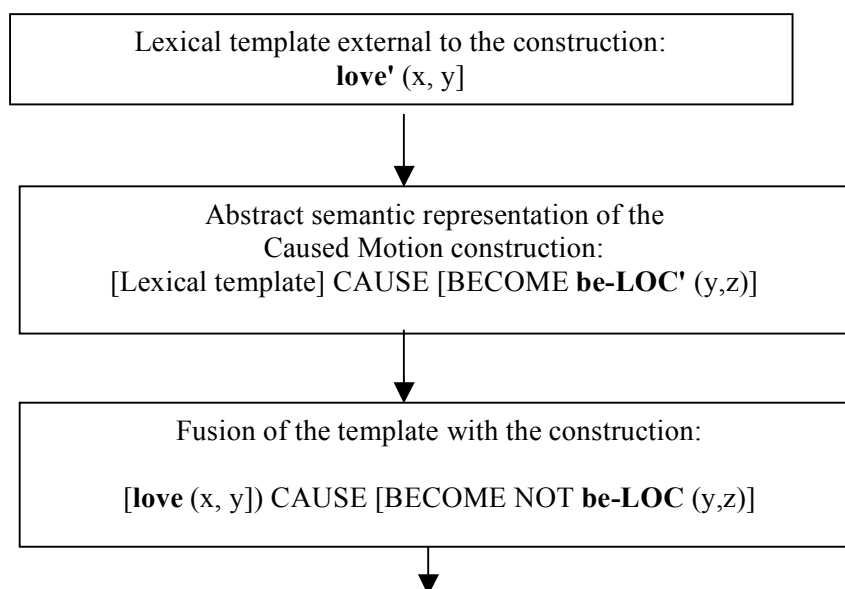
Figure 5: Simplified representation of lexical-constructural subsumption in *laugh out of*

The lexical template associated with the predicate *laugh* is that of a transitive activity predicate. This template experiences a process of subcategorical conversion whereby an effectee (or experiencer/goal) and a prepositional phrase is added to the original structure. As already mentioned, this is instantiated by the high-level metaphor EXPERIENTIAL ACTION IS EFFECTUAL ACTION and the associated external principles. The construction conflates the roles of ‘affected object’ and ‘actor’ into one element of structure (“John” in the example). It also conflates into one single predicate (‘laugh’) two predicate values: causing motion and manner of causing motion. The resultative part comes from the caused motion construction which encodes the relationship of cause-consequence between two events:

(60) Peter laughed at John' → 'John went out of the room

The first event is represented in terms of the lexical template for ‘laugh’ and the second event is encoded by means of an abstract predicate BECOME, an operator NOT and a lexical template indicating location (**be-in'** (y,z)).

A different case is that of state predicate which needs to be reinterpreted as an activity predicate. This conversion process is licensed by a high-level metaphor AN EMOTIONAL STATE IS AN EFFECTUAL ACTION, whereby the target domain (the state lexical template) is interpreted as an effectual action (the source domain) since all the external principles (e.g. the Correlation Principle, the mapping enforcement principle) allow such a metaphorical mapping.



<p>Fully specified semantic representation:</p> <p>[love (Peter, Mary)] CAUSE [BECOME be-LOC (Mary, life)]</p>

Figure 6: Simplified representation of lexical-constructional subsumption in *love into*

The participants in an emotional state are called a *sensor* (the entity who feels) and a *phenomenon* (the emotion that is felt) (cf. Halliday, 1994). According to the Correlation and Invariance principles, this metaphorical mapping is licensed because all the elements in the source are mapped onto the target; the sensor is an effector; the phenomenon is an effectee; sensing is an activity.

5. Final remarks

This work has given an overview of a new model for understating the relationship between lexical and syntactic meaning called the Lexical Constructional Model. This new framework draws insights from functional models of language (especially, RRG) and Cognitive Linguistics (especially, Goldberg's constructional approach) in order to investigate the way lexical and constructional representations interact. The initial claim is that a theory of semantic interpretation should be constructed on the basis of two representational mechanisms, i.e. a lexical and a constructional template, and a set of cognitive constraints that regulate the unification between the two constructs. Lexical templates, an enriched semantic representation of the logical structures proposed in RRG, are constructed on the basis of a universal semantic metalanguage which allows us to produce typologically valid representations. Besides, lexical templates provide enriched semantic representations since they combine low-level and high-level semantic components: the former are shared by items belonging to a number of lexical classes; the latter are specific to the item in question. We have further postulated that lexical templates are absorbed by constructions in the form of a unification process that is governed by *external* and *internal* constraints. We have spelled out the different kinds of constraints and explored their role in regulating the production of fully specified semantic representations. We have argued that constructional coercion is a motivating factor for internal constraints to be operational, while coercion itself is contingent on higher-level constraints in the form of high-level metaphor and metonymy.

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