Frames predict the interpretation of lexical omissions

Josef Ruppenhofer
Department of Computational Linguistics and Phonetics
Universität des Saarlandes
66123 Saarbrücken
Germany
josefr@coli.uni-saarland.de

Laura A. Michaelis
Department of Linguistics
University of Colorado
Boulder, CO 80309
USA
laura.michaelis@colorado.edu

August 21, 2009

Frames predict the interpretation of lexical omissions

Abstract

Despite the idiosyncrasies of null-complement phenomena observed by Fillmore (1986), many researchers have pursued large-scope, single-factor explanations, in particular, based on Aktionsart (Rappaport Hovav & Levin 1998) and selectional restrictions (Resnik 1993). We argue instead for a limited implicational regularity tying the interpretation type of an omitted argument to the frame membership of its predicator. We show that our account is robust, that exceptions can be explained based on independently motivated principles and that the proposed generalization can be motivated by reference to the discourse status of comparable overt arguments in both lexically and constructionally licensed omissions. Finally, we argue that successful generalizations in the realm of null complementation are likely to be narrow rather than broad in scope.

1 Introduction

If the purpose of syntax is to encode meaning, it follows that the meaning of a predicator determines its combinatoric potential. For example, the verb *contribute* selects the syntactic dependents that it does (NP, NP, PP) because it denotes a transfer event that involves the three corresponding semantic dependents agent, theme and recipient, as in, e.g., *She contributed $100 to the campaign*. But speakers are not always maximally explicit, and (1-3) are equally valid alternatives:

(1) She **contributed** to the campaign.

(2) She **contributed** $100.

(3) She **contributed**.

The interpreter of (1) is required to recover a recipient argument, that of (2) a theme argument and that of (3) both a recipient and theme argument. While such examples might appear to illustrate a general effort-conservation strategy of omission up to recoverability, not all predicates display the same degree of flexibility. The apparently parallel transfer verb *convey* is a case in point:

(4) *International aid teams **conveyed** to Burma.

(5) International aid teams **conveyed** supplies.

(6) *International aid teams **conveyed**.

When precisely do speakers leave semantic roles unspoken and how do these constraints aid the interpreter in recovering those missing roles? Since Fillmore's seminal 1986 work on lexically licensed null complements in English, scholars have turned increasingly toward single-factor explanations, in particular, recoverability of the unstated argument (Resnik 1993, Goldberg 2006) and Aktionsart of the licensing verb (Rappaport Hovav & Levin 1998, Wright & Levin 2000). But these explanations are undermined by the very idiosyncrasies that Fillmore emphasized: lexical differences (nearly synonymous predicators

like *eat* and *devour* differentially allow omission of the theme argument), interpretive differences (e.g., *I know* ∅ has an anaphoric null argument while *I was eating* ∅ has an existential one) and effects of constructional context (e.g., verbs that disallow null complements when interpreted episodically allow them in generic/habitual contexts, as in *She impresses* ∅ *every time*). The nonuniformity of null complementation phenomena suggests that gaining predictive power in this domain requires a suite of narrow-scope generalizations.

Using data from the British National Corpus (BNC), we suggest such a generalization, based on the frame-semantic categories of null complement-licensing predicators: if two or more verbs belong to the same FrameNet frame (in terms of Johnson et al. 2002) and license the omission of a particular frame element (FE), the interpretation type of the omitted FE is the same for all such predicators. For example, among the lexical units in the Arriving frame (e.g., *approach, arrive, come, enter, return*), some allow omission of the Goal FE under anaphoric interpretation (7), while others (e.g. *reach, get*) do not (8).[1] However, no lexical unit allows omission of the Goal under existential interpretation (9):

(7) We **arrived** (in Sydney) at eight in the morning.

(8) Our last stop before we **reached** *(Sydney) was Canberra.

(9) #A: Bill just told me he **arrived**. B: Oh where? A: I don't know. Just somewhere.

We demonstrate both the robustness of this implicational regularity and the motivated nature of exceptions to it, arguing that it provides a better account of the data than competing explanations.

The rest of this paper is structured as follows. In section 2, we introduce a typology of omissions in order to delimit the set of facts we intend to account for. In section 3, we provide evidence for our central claim: the construal type of a null complement is predicted by the frame membership of the predicator that licenses that complement. In section 4, we compare our account with previous analyses, focusing on explanations in terms of lexical aspect and selectional restrictions. In section 5, we discuss a potential motivation for the frame-based generalization based on the discourse status of overt arguments of predicators that license null instantiation. In section 6, we discuss why valid generalizations about null instantiation are likely to be as narrow in scope as the one that we offer. We offer concluding remarks in section 7.

[1] The omissibility contrast for the Goals of *arrive* and *reach* might appear attributable to the grammatical functions of the uninstantiated arguments. English does not generally allow definite (as opposed to indefinite) null complements that represent direct objects (as opposed to clauses and obliques). However, the following examples illustrate that this is not a hard constraint:

(i) They **approached** (me) slowly.

(ii) Could I **see** (it)?

(iii) **Give** me (that)!

iv I **won** (the race).

2 Typology of omissions

Omissions of core arguments of predicates are categorized along two dimensions: the identity of the licensor and the interpretation that the unrealized argument receives. Licensor classification is based on the observation that either a particular predicator or a particular grammatical construction must be present in order for the omission of a frame element to occur. For instance, in (10) the omission of the agent is licensed by the passive construction:

(10) No doubt, mistakes were **made** ∅

The preceding omission is a constructional one because it can apply to any verb that combines with the passive construction. By contrast, the omission below is lexically specific: the verb *arrive* allows the Goal to be unspecified whereas the verb *reach*, also a member of the Arriving frame, does not, as seen in (8) above.

(11) We **arrived** $\varnothing^{Goal}$ at 8 pm

These two examples also illustrate the second major dimension of variation: the interpretation of the omitted argument. In the case of the passive construction in (10) the protagonist making the mistake is only existentially bound within the discourse, that is the omission is an instance of indefinite null instantiation (INI). By contrast, the Goal location of *arrived* in (11) is an entity that must be accessible to speaker and hearer from the linguistic or physical discourse context, that is, it is an instance of definite null instantiation (DNI).

Of the four possible combinations of licensor and interpretation, the current study targets only lexically licensed omissions. For more discussion of the properties of various constructionally licensed omissions, we refer the reader to Ruppenhofer (2004) and Goldberg (2006). For discussion of how null complementation may be represented, we refer the reader to Kay (2004) for a construction-grammatical treatment and Gillon (submitted) for a model-theoretic approach.

2.1 Complications

There are two kinds of cases that present problems for the above typology. In the first class of cases it is hard to decide whether to call an omitted FE an instance of DNI or of INI. In the second class of cases, the absence of an FE is more appropriately treated as licensed by a macro-role relationship, or by a frame-internal construal alternation, than as an instance of null complementation.

2.1.1 Difficulties identifying the interpretation type

Consider the Body_movement frame, which is concerned with events of Animate beings moving body parts. As exemplified in (12) and (13) by the verb *pout*, many verbs in that frame can occur with the Body_part being unspecified.

(12) [They ^{Agent}] both **pout** [their bottom lip $^{Body\_part}$] and suck their thumbs.

(13) Her only top-three finish at the worlds was a silver last year , when [she ^{Agent}] **pouted** and took the medal off her neck on the podium.

On the one hand, we could call these omissions DNI, since we can identify a specific individual as the possessor of the relevant Body_part. On the other, these omissions can occur without the Body_part ever being mentioned in the discourse, suggesting that these cases are actually like that of *She smokes, I ate at noon*, etc., in which interpreters can resolve the unrealized argument to a specific referent based merely on world knowledge.

Another frame where a similar situation obtains is the Conduct frame. The verb *behave* may occur either with an overt Manner specification (14)[2]or without one (15):

(14) Just **behave** [as if we were back at home ^{Manner}], " said Hazel.

(15) Now apologize and **behave** $\varnothing^{Manner}$, or go and ride with your mother.

Uses such as (15) have to be interpreted as 'behave well'. While we know the particular value of the Manner specification, it need not be mentioned at all in the discourse. Such examples thus again raise the question of whether to call the omitted FE a case of DNI or INI. For our purposes, it is essentially arbitrary which view we take on cases like Body_part in the Body_movement frame and Manner in the Conduct frame, as long as we take a consistent view for all lexical units in the same frame.

2.1.2 Non-instantiation

In this section we will draw a distinction between non-instantiations and null-instantiations, and exclude the former from our purview. In discussing non-instantiations, there are two sub-cases to consider: (a) two alternative construals exist in the same frame, and (b) several FEs belong to a single macro-role. An example of a frame that contains two alternative construals is the Separating frame.[3] One construal is the break-up construal exemplified by (16), which involves a whole and a set of subparts created from that whole. The second construal is the splitting-off construal, exemplified in (17). It includes a source argument (Part 2) and a theme argument that moves away from Part 2 (Part 1).

(16) [The field of twelve teams ^{Whole}] was **split** [into four groups of three ^{Parts}]

(17) Behind them the wind **split** [a bough ^{Part_1}] [from a tree ^{Part_2}] with a sharp crack

Now, when one construal is chosen over the other, it is not meaningful to say that the FEs associated with the other construal are missing. That is, it would be inappropriate to analyze (16) as involving null instantiation of Part 1 and Part 2. Likewise, (17) does not exemplify null-instantiation of the Parts FE. This is not to say that these two construals do not allow null instantiation of their arguments. For example, when the break-up construal is chosen, one can find instances of indefinite null instantiation of the Parts FE, as in (18).

[2]It is worth pointing out that, despite its name, which implies adjunct status, Manner is a core frame element in this frame.

[3]Arguably, the two construals could also be analyzed as distinct frames. We will, however, rely on the current frame organization of Framenet.

(18) [Palestine ^{Whole}] has been **partitioned** a number of times .

A second, similar case consists of frames in which all FEs from a set of several compatible frame elements can be instantiated, but only one must be instantiated. FrameNet refers to such constellations of FEs as coresets. An example of a coreset is given by the Verdict frame: in the Verdict frame, either the Charges (19) or the Case (20) or both (21) can be expressed.

(19) [The two Koreans firms ^{Defendant}] have been cited for alleged dumping each year since 1993 but each time have been **cleared** [of the charge ^{Charges}].

(20) Also Tuesday , Hamas leaders stepped up their criticism of [the Palestinian Authority , which ^{Judge}] **cleared** [Israel ^{Defendant}] [in the March 29 killing of the group 's chief bombmaker ^{Case}].

(21) [A jury ^{Judge}] **acquitted** [him ^{Defendant}] [of attempted murder and aggravated assault ^{Charges}] [in the shootout case ^{Case}].

When neither of these FEs is instantiated, one still has to be able to infer either one or both of them.[4] Example (22) requires a DNI construal, but it is not clear which of the two metonymically related FEs is 'really' missing.

(22) Palestinian Authority officials unequivocally **cleared** Israel .

Context may but need not necessarily point to a particular FE as the missing one, if both FEs have been mentioned before. For our purposes, the non-instantiation of a specific subtype FE of a macro FE is not important; we will only be interested in whether the macro FE is instantiated or not.

3 Predicting the interpretation type of a null complement

We now turn to our main concern, the prediction of a lexically licensed omission's interpretation type. We stress that we are not trying to predict the null-complementation affordance itself. That is, we will not give an account of why *arrive* allows the omission of its Goal FE but *reach* does not. In our estimation, that prediction cannot be successfully made. Neither do we consider it possible to predict which of a lexical unit's arguments is omissible based on the morphosyntax, grammatical function, or universal semantic role of the arguments. We deliberately restrict our account to the interpretation type of arguments that we know to be omissible. That is, we explain why, when the Goal of *arrive* is omitted, it is interpreted as a DNI rather than an INI. The reasons why we consider the other two predictions to be infeasible will be discussed further in section 6.

[4]The situation with coresets seems similar to the cases that Ackerman and Goldberg discuss in their work on Obligatory adjuncts: an additional piece of information needs to be given to make a predication pragmatically felicitous in context but which one is not fully constrained.

3.1 The framal implicational account

As defined by Fillmore (1982, 1985), Frame semantics is a semantics of understanding. It assumes that lexical units are organized in the mental lexicon according to which scenarios or schematic experiences they are used to talk about. Rather than being concerned with meanings consisting of atomic features such as [+human] or [+slow], the unit of analysis are abstract holistic experiences. Individual lexical items are taken to refer to particular participants or to impose a particular profile on the relations within the larger scenario.

To illustrate, consider the Revenge frame, which we can define as follows.

> An Agent performs a Response action on an Offender as a punishment for an earlier action, the Injury, that was inflicted on an Injured party. The Agent need not be identical to the Injured party but needs to consider the prior action of the Offender a wrong. Importantly, the punishment of the Offender by the Agent is seen as justified by individual or group opinion rather than by law.

The words and multi-word expressions that evoke the Revenge frame include *avenge.v, avenger.n, get back ((at)).v, get even.v, payback.n, retaliate.v, retaliation.n, retribution.n, retributive.a, retributory.a, revenge.n, revenge.v, revengeful.a, revenger.n, sanction.n, vengeance.n, vengeful.a, vindictive.a.* Some of these are exemplified in (9)-(11).

(23) [Deep River ^{Agent}] **avenged** [an earlier round-robin loss to the Petawawa Pepsis ^{Injury}] [by defeating them 4-0 to win the A final game ^{Responseaction}].

(24) Among the conventions of the genre, the ghost of the person to be avenged appears to spur on [his ^{Injuredparty} **revenger**].

(25) Syria has warned the United States of **retaliatory** [measures ^{Responseaction}] if Washington launches another incursion into the country's territories.

While these words profile different parts of the overall Revenge frame-the verb in (23) refers to the overall scenario, the noun in (24) denotes the Agent frame element, and the adjective in (25) modifies the Response action-all of them need to be interpreted against the same overall scenario.

Let us now consider some of the roles that can be omitted by the verbs in the Revenge frame. As example (12) shows, the FE Injury, denoting the prior action that is to be punished by taking revenge, can be omitted. This same example also illustrates that the Response action FE may be missing.

(26) John intended to **avenge himself on/get back at/get even with/ retaliate against/take revenge on** Sue $\varnothing^{Injury}$ $\varnothing^{Response_action}$

Note that the interpretation type of the unexpressed Injury FE is different from that of the unexpressed Response action. While the former is a case of DNI, the latter is a case of INI. More importantly, the interpretation of both kinds of missing FEs is the same for all the verbal predicators illustrated in (26), and in fact for all verbal predicators in the frame. That is, there is no verbal

predicate that can omit the Injury FE under an INI interpretation and none that can omit the Response action FE under a DNI interpretation.

In fact, we want to claim here that the regularity concerning the interpretation types of the Injury and Response action FEs in the Revenge frame is but one instance of a more general regularity, which we state as follows:

> If a particular frame element role is lexically omissible under a particular interpretation (either anaphoric or existential) for one lexical unit in a frame, then for any other LUs in the same frame that allow the omission of this same FE, the interpretation of the missing FE is the same.

Let us consider the scope of this implicational characterization. First, the implication applies separately to each individual FE of a particular frame. Thus, there is no contradiction in the fact that the Injury FE can be omitted under a DNI interpretation and the Response action under an INI interpretation. Equally important is the fact that frame elements are frame specific. Thus, if a frame other than Revenge also had a Frame Element named Injury, then the two would have to be treated as distinct. Should the Injury FE in that other frame also be omissible, then we could not, and would not have to, make a prediction about its interpretation type based on the facts in the Revenge frame. Lastly, the implication does not require that an FE that can be omitted by any verbal predicate in a frame can likewise be omitted by all the other verbal predicates in the frame. Accordingly, it also captures the facts in the Arriving frame, where, as shown by the earlier examples (8) and (11), some verbs like *arrive* can omit the Goal FE but others such as *reach* cannot.

Although we cannot logically prove or exhaustively demonstrate that our implicational generalization holds-there are too many frames and frame elements to check-we can at least subject our prediction to a simple plausibility check. For this purpose, we randomly selected 15 frames that (1) had more than one verb, (2) for which there existed annotation, (3) also had more than one core FE, (4) of which at least one could be null-instantiated. In cases of multiple null-instantiable FEs, we picked one randomly. The table below gives the Frames that we checked as well as the FE in the frame and its interpretation type.

Frame	FE	LUs	Type	Example
Separating	Parts	part,split, divide,separate, partition	INI	Let's DIVIDE the loot later.
Remembering to do	Action	forget, remember	DNI	I'd quite FORGOTTEN till now .
Activity _resume	Activity	renew, restart, resume	DNI	We RESUMED an hour later
Grasp	Phenomenon	grasp, understand, comprehend, get, see	DNI	You 'll UNDERSTAND when you get a little older.
Becoming a member	Group	enlist, enroll, enter, join, sign up	DNI	That summer he ENLISTED as an air-raid warden.
Amalgamation	Whole	amalgamate, blend, combine, fuse	INI	Simmer until the flavours have BLENDED.
Bungling	Action	blow, botch, fuck up, screw up	DNI	I SCREWED UP big time.
Filling	Theme	coat, daub, fill, load	INI	I sat there for an hour STUFFING my stomach.
Conduct	Manner	act, behave, conduct o.s., carry o.s.	DNI, INI	Oh, behave!
Body movement	Body part	blink, crane, shrug, wave	DNI, INI	Owen WAVED to him urgently.
Quitting	Employer	abdicate, leave, quit, resign	DNI	I quit!
Exclude member	Group	excommunicate, expel	DNI	Please, some bishop, any Bishop, EXCOMMUNICATE her.
Bearing arms	Weapon	bear arms, carry, pack	INI	Careful, that guy CARRIES.
Institutionalization	Facility	commit, hospitalize, institutionalize	INI	We had to HOSPITALIZE him.

3.2 Accounting for Exceptions

Like many linguistic regularities, the framal regularity concerning the interpretation type of omitted FEs has some exceptions. However, study of these exceptional cases shows that in addition to being few, they are motivated ones.

Consider, for example, the contrast between the verbs *resign* and *retire* as they pertain to employment or the occupation of an official role. Both designate a situation in which a person, the Employee, gives up her work relation with their company or institution, the Employer. However, while a felicitous use of *resign* with the Employer null-instantiated requires that the referent be recoverable from context, this is not true for *retire*.

(27) [Mr Spitzer ^{Employee}] **resigned** $\varnothing^{Employer}$ today amid the scandal over a $US1000-an-hour ($1070) prostitute.

(28) My mom is not looking forward to the fact that [my dad ^{Employee}] is going to **retire** $\varnothing^{Employer}$ soon.

We account for the exceptional behavior of *retire* by proposing that it, unlike other lexical units in the Quitting frame, entails that the Employee has undergone a permanent status change: s/he is no longer in the labor market. Crucially, we note, this focus on the current status of a participant (rather than on the precipitating event) also motivates the following omission, licensed by the existential perfect construction (Goldberg 2005):

(29) [This lion ^{Killer}] has **killed** $\varnothing^{Victim}$ before.

By having killed, the lion has acquired the status of being a dangerous animal. Thus, the resultant-state entailment, whether constructional or lexical, overrides the interpretive bias imposed by membership in a particular Framenet frame.

Exceptions of this same type also occur in the area of kinship terms and personal relationships. Most of the predicates and relational nouns in the area of kinship are normally used in contexts where a specific pair of individuals is accessible in discourse. In (30), the mother in question is the mother of a discourse accessible playdate of the speaker's son. In (31), the miniature pinscher's relative in question is the Doberman pinscher.

(30) And, as I got to know the **mother** [$\varnothing^{Relative}$] better, I realized we had little in common.

(31) The miniature pinscher originated in Germany several centuries ago, and even though he looks like a small Doberman pinscher, he is not **related** [$\varnothing^{Relative}$].

Clearly, the predicate *related* is not informative to assert without a relative being specified. Being related to somebody is true of all individuals and species. However, with some of the nouns like *mother* or *father* , it is in some contexts informative enough that the person in question has that kind of relationship to another person. Consider example (32), where the second relative, Mr. Smith's child, need not have been mentioned before at all.

(32) Mulder offered himself as a hostage in exchange for Mr. Smith, who had just become a **father** [$\varnothing^{Relative}$] for the first time.

Father can have its argument omitted here because being a father itself is a status that has significance: the person has responsibilities toward others who depend on him. Clearly, no such status attaches to other kinship relations like that of *cousin* or *uncle* in Western cultures, and it is hard to imagine a felicitous use of example (33).

(33) Please, I beg you, let the man go! He is an **uncle** $\varnothing^{Relative}$.

The notion of status also explains why certain non-nominal predicates in the Personal relationship frame allow omissions with existential rather than anaphoric interpretation. For instance, while *friend* can omit the FE Partner_1 only under anaphoric interpretation, as shown in (18), the adjectives *married* and *divorced* have a status-meaning and thus allowing existential rather than anaphoric omissions.

(34) The mother strongly denies the claims, saying he is just a **friend** ∅ who sometimes helps around the house.

(35) I get butterflies in my tummy just thinking of him. But the thing is he's **married** ∅ and he wants to see me on the side.

(36) In the suburbs, if a woman in her late twenties tells you her latest guy's got baggage, it means one thing, more often than not: He's **divorced** ∅ with kids.

Apart from these status-based exceptions, we have not found any others so far.[5]

4 Competing explanations

Our framal implicational account of null-complement interpretation type can profitably be contrasted with alternative analyses. We argue in the following subsections that our frame-level generalization is preferable to single-factor explanations based on lexical aspect or selectional restrictions. The framal generalization captures the regularities that motivate such analyses-lexical units that share a frame also tend to share selectional restrictions and Aktionsart class-but it has the added benefit that it avoids the over- and undergeneralizations that result from tying the null-complementation affordance to a single semantic/pragmatic feature.

4.1 Selectional restrictions

Resnik's (1993, 1996) theory of object omission is strongly centered on the identity of the predicate. The basic intuition is that certain verbs carry enough information about their objects that they do not need to overtly express them. Coming from a computational background, Resnik has formalized the notion of selectional strength as an information-theoretic metric and has tested his theory in quantitative work. Though selectional strength may seem to characterize only cases of indefinite null instantiation, Resnik (1993, 1996) also applies the notion of selectional strength to definite null instantiation. The basic distinction between the two verb types is said to be that the verbs allowing indefinite object omission select even more strongly and therefore do not require overt antecedents in the discourse for their objects.

The frame-based account makes the selectional strength account redundant. This is desirable in so far as that account portrays null instantiation as a pure processing effect. Resnik's notion of selectional strength is not really concerned with the specific semantics of predicates but rather with the processing of one aspect of a predicate's semantics, its selectional restrictions. But if null-instantiation was really a by-product of processing then we would not expect to find that certain very strong selectors cannot license omission. Consider the example *devein*. This verb basically occurs only with objects of type 'shrimp' but

[5]This also means that we have not found any exceptions such that the LUs in a frame typically omit a particular FE under existential interpretation but a few 'rogue' LUs omit the same FE under anaphoric interpretation. It is not clear whether there really are no cases like this and, if not, whether this is a 'deep' fact.

there are no non-habitual/generic uses where the object can be omitted, contrary to what a selectional strength account should predict. On the other hand, *devein* behaves like other words relating to emptying containers and clearing areas of some substance or items:

> bone.v, clear.v, core.v, debug.v, deforest.v, defrost.v, degrease.v, delouse.v, denude.v, descale.v, disembowel.v, divest.v, drain.v, empty.v, emptying.n, eviscerate.v, expurgate.v, gut.v, peel .v, purge.v, rid .v, scalp.v, skin.v, strip.v, unload.v, void.v

These words all belong to the Emptying frame and, in non-generic sentences, they have to take an overt Source frame element as their direct object as in (24).

(37) Pat **cleared** the table of dishes.

Many of the verbs of Emptying seem to be rather strong selectors. For example, *bone* occurs in the BNC with overt objects that are the names of fish or meat in preparation for eating; *core*'s overt objects are noun phrases headed by apple, lamb, or turkey. This kind of range does not seem to be significantly larger than that of, say, *knit* or *sew*. Yet while *knit* and *sew* can omit their object, *bone* and *core* cannot.

The selectional strength account not only faces exceptions in regards to omissibility but also makes incorrect predictions about interpretations of many predicates that do allow an omission. Consider, for instance, the verb *know_2* ('wissen/savoir'): it has extremely narrow selectional restrictions, taking only propositions. Now certainly there are a lot of different propositions conceivable but still the type is perfectly narrowly delimited and thus the interpretation type should be INI. But it is actually DNI. Similarly, verbs like *deplane* or *board* have very strong selectional preferences for certain kinds of vehicles but their interpretation is DNI not INI.

Resnik's account also does not account for the regularity in the interpretation of null instantiation across the lexical units within frames. The processing that Resnik has in mind depends on individual lexical units rather than on classes and if lexical units in the same frame have different selectional strengths then they should be able to have different null instantiation interpretations for the same frame element. As argued in section 7, although there are some exceptions, this is not generally the case. An additional argument against a processing account is that one does not seem to find an association between argument omission and a lemma's degree of polysemy or its frequency: there does not seem to be a cutoff point on one side of which verbs allow null instantiation and on the other side of which they do not (Ruppenhofer 2004). There also is no clear boundary in terms of selectional strength between the two types of lexical null instantiation, or between null instantiating verbs and verbs that do not allow null instantiation, as Resnik points out himself (1993:86). Finally, although the selectional strength account is intended to apply to lexically licensed omissions only, it begs the question what its relation to constructionally licensed omissions is. If constructional omissions are not sensitive to selectional strength, what is it that governs them? Conversely, if a verb that cannot lexically omit an argument because it does not select a particular kind of filler strongly enough, does omit that argument in a particular constructional context, how can a hearer interpret such an utterance, given that the selectional preferences are weak?

4.2 The Aktionsart-Based Account

Rappaport Hovav and Levin (1998) (henceforth RH&L) present a theory of argument realization based on the combination of verb meanings with a set of universal aspectual templates. This theory also makes predictions regarding null instantiations.

According to RH&L's theory, the idiosyncratic aspects of meaning (what distinguishes e.g. *jog* from *run* from *trot*) are recorded in the lexicon. Next to the lexicon there exists a fixed set of lexical semantic templates provided by Universal Grammar. These templates consist of various combinations of semantically primitive predicates. The templates correspond to a large degree to well-known event types such as accomplishment, etc. Using a verb then means combining the idiosyncratic lexical information with an event structure template. The event types that RH&L recognize are:

Combining a verb with a template is taken to mean inserting the verbal constant into the variable slot in the template. (The slots have type constraints on them. For instance, the Activity template has a slot that accepts a manner-denoting verbal constant.) Constants can be modifiers of another predicate in the template (in this function the constants are written as subscripts) or they can function as predicates within the template. Constants (i.e. lexically specified verb meanings) contribute the following information:

- based on its ontological type, each constant is associated with some basic template in accordance with a so-called canonical realization rule
- the number of participants

The number of participants that a constant specifies may exceed the number of slots in the template (e.g. activity verbs with two participants such as *sweep*). RH&L call participants that are licensed by the template structure participants, participants licensed only by the verbal constant only are called constant participants. According to RH&L, the two kinds differ in how their realization is licensed.

When a constant is inserted into a template other than the one specified for it by its canonical realization rule, RH&L speak of Template Augmentation: 'Event structure templates may be freely augmented up to other possible templates in the basic inventory of event structure templates' (p. 111). In other words, no new templates can be created, which is said to account for the failure of accomplishment verbs to receive an activity interpretation: the only available activity template is too small for the template an accomplishment verb has lexically and in fitting verbs into other templates, no information contained in their basic template can be thrown away. The badness of **He built a house for 6 months* is explained in this way.

RH&L posit two well-formedness conditions on the syntactic realization of (basic or augmented) templates.

- Subevent Identification Condition

  > Each subevent in the event structure must be identified by a lexical head (e.g., a V, an A, or a P) in the syntax (p. 112)

- Argument Realization Condition

  > There must be an argument XP in the syntax for each structure participant in the event structure.[6]
  >
  > Each argument XP in the syntax must be associated with an identified subevent in the event structure.

As discussed by Rappaport Hovav and Levin 1998 and 1999, two interesting predictions regarding null instantiation arise from these constraints. First, all constant participants should in principle be omissible. This would apply to the objects of transitive activity verbs as well as the non-subject complements of bivalent stative verbs. The reason is that the activity and the state templates and the achievement template which contains a state template have only one slot, namely the one for their active-form subject. The objects of these verbs are thus only constant participants, that is, they are part of the conceptual semantics associated with the constants but do not have to be mapped into the syntax by the subevent identification or the argument realization conditions. Rappaport Hovav and Levin follow Brisson (1994) in assuming that constant participants are subject only to a recoverability condition based on prototypicality (1998:115), which corresponds to what we call existential interpretation.

Second, objects of resultative constructions need to be realized because they are structure participants of the resultant state predicate. This applies not only to resultative constructions involving an overt secondary predicate naming the resultant state but also to lexical accomplishment verbs like *break* or *dry*: while the verb can identify both sub-events, the subject cannot discharge the realization requirement for the object. The predictions on null instantiation thus fall in line with RH&L's observation that 'result verbs show a much narrower range of variation in meaning and syntactic context than manner verbs' (p. 101). However, it is not clear if the account given is meant to extend to accomplishment verbs like *sew, paint, write* that do not involve a change of state of an existing entity but rather talk about coming into existence. One could extend the account by choosing EXIST as the state predicate inside the accomplishment template. However, then the template account would make an incorrect prediction because creation verbs can in fact omit their objects. As pointed out by Mittwoch (1982), creation verbs omitting their argument typically occur in the progressive and have an activity reading, as in *Kim was sewing in the bedroom.*

Apart from any problems one might find with analyses of specific predicates, the account given by RH&L has two important general problems. First, it either does not cover stative predicates with two obligatory arguments such as *resemble* or *adjoin* at all, or, if they are meant to be covered by the simple state template, most of their null instantiation properties are wrongly predicted. Recall that stative relational predicates such as *know* omit their non-subject arguments under anaphoric interpretation-with the exception of the status-denoting subtype such as *married* or *retired*. Second, RH&L's account is circular in that it uses the realization facts-an argument is either a constant or a structure participant-to predict omissibility even though omissibility seems to be the only factor that motivates the representational distinction in the first place. Neither RH&L

[6] Linking rules determine the particular realization on the basis of an argument's position in the lexical semantic representation

1998, 1999, or Levin 2000 mention any other observable phenomenon that correlates with the two types of participants. The alternative frame-based analysis preserves the insights of the aspectually based account in so far as aspectual class is typically shared within a given frame. But it also easily accommodates data that the aspectual account does not predict. For instance, the verb *prepare* occurs with an anaphorically interpreted Activity-Frame Element in the Activity_prepare frame, which is exemplified again in (38).

(38) I was excited about doing it again, and I **prepared** $\varnothing^{Activity}$ for a week in advance.

The fact that *prepare* denotes an activity would suggest from an aspectual class view that the prepared-for-event FE should have an existential interpretation rather than an anaphoric interpretation. The reason is that the Activity template has only one structure participant and constant participants are assumed to be recoverable as prototypes. However, the prediction is clearly not borne out for *prepare* in (38): the Activity is anaphorically omitted.

5 Motivating the framal generalization

The implicational regularity concerning the interpretation type of omissible arguments is descriptively robust. We have, however, not explained why there should be a connection at all between a predicate's framal semantics and the interpretation type of its omissible arguments. Nor have we explained why the interpretation type of a given lexically omissible FE is what it is—that is, we have not explained why, e.g., the Goal FE of *arrive* and *enter* in the Arriving frame is construed anaphorically when omitted whereas the Produced Food FE of *bake* in the Cooking creation frame is construed existentially when omitted.

The answer we offer to the first question is an argument based on plausibility: there is other, independent evidence that frames are the sort of things that can influence argument construal. For instance, Sullivan (2007) has argued that detailed frame semantics determines which of various predicates with meanings in the same domain can actually participate in particular sub-mappings of a more general metaphor. For example, as she observes (p. 5), the adjective *brilliant*, unlike adjectives such as *bright* and *sunny*, never means 'cheerful' or 'happy'–witness the oddness of *looking on the brilliant side*. Sullivan notes that while nonmetaphoric *bright*, *sunny* and *dark* often modify nouns denoting a location (*bright room*, *sunny place*, and *dark corner*), *brilliant* is rarely used in this way: *brilliant place* or *brilliant street* are rather uncommon. Sullivan attributes this difference to the fact that adjectives like *bright* and *sunny* usually evoke the Location_of_light frame, which involves a location where the light is apparent, whereas *brilliant* typically refers to light emanating from a source, as in *brilliant star* or *brilliant torch*. These uses evoke the Light_movement frame, which does not involve a location element. Accordingly, adjectives like *brilliant* cannot participate in the mapping HAPPY STATES ARE LIT LOCATIONS, apparent in preposition phrases like *in a dark state of mind*, which is part of the larger HAPPINESS IS LIGHT metaphor.

In Sullivan's metaphor analysis the connection between a predicate's frame semantics and the construal of its arguments involves conceptual structure. In the case of null instantiation, to which we now return, the connection appears to

come from discourse-pragmatic constraints on frames. Specifically, we suggest that particular FEs in particular frames may have strong biases towards certain discourse statuses. Michaelis & Francis (2007) observed the influence of this bias on quantifier scoping in their discussion of the acorn-oak data exemplified in (39):

(39) a. *An acorn **grew** into every oak.

b. An oak **grew** out of every acorn.

The transformation pattern in (39a) requires a topical subject expressing the raw material, whereas the creation pattern in (39b) allows a focal subject expressingng the resultant product. Given that topical NPs normally outrank nontopical NPs and subjects outrank objects (Ioup 1975), a clash results in (39a).

In the case of the argument omissions we consider here, a strong indicator of framal bias for particular discourse statuses is the fact that the interpretation of an omissible argument strongly tends to match both the dominant interpretation of overtly instantiated instances of the frame element and the dominant interpretation of overt and non-overt instances considered together. This tendency is illustrated by the data in Table 1, which is based on data randomly sampled from the British National Corpus. The table shows that for instance, in the case of *arrive*, the interpretation for a null instantiated goal argument is definite, and that of all obliques occurring with *arrive* 97.5% are definite, e.g. *in Swaziland, in the clubhouse*. The table shows that with the exception of *reap* and *carve*, the interpretation of the null instantiated uses agrees with the majority of all the uses, null instantiated and overt combined. Further, if one considers only overt arguments, for each predicator, the predominant interpretation of the relevant argument when overt matches the construal type of that argument when omitted. For instance, among all uses of *pass*, in the sense of 'receive a passing grade on', 59.1% of the overt objects have a definite interpretation and 22.7% of the overt uses have an indefinite interpretation.

The data reported in Table 1 suggest that an argument's discourse-pragmatic status is determined at the lexeme level, perhaps as a constraint on the lexeme's valence members. This finding lends further support to Lambrecht's (1995) observation that information-packaging goals (backgrounding or foregrounding particular arguments) drive lexeme selection. Because lexemes have idiosyncratic properties, we expect to find verbs whose overt definiteness preferences do not match their covert construal patterns. As mentioned, the verb *carve*, belonging to the Create_representation frame, is one such exception. But what of frame-level patterns? It remains to be determined whether the observed correlation between NC interpretation type and overt-complement definiteness holds as well at the frame level. Certain facts about constructionally licensed null complementation suggest that this correlation may indeed prove to be a general one. Note the following examples, discussed by Ruppenhofer (2004):

(40) Method: Blend all the ingredients in an electric blender. **Serve** ∅ cold.

(41) ∅ **Contains** alcohol.

(42) ∅ **Walked** on the racecourse; ∅ **bought** < stockings > cakes in Lewes.

Verb	type	total tokens	total NC (%)	uses with same definiteness value out of total (%)	overt uses with same definiteness as NC (%)
arrive	DNI	196	122 (62.2)	191 (97.5)	70/74 (94.6)
bathe	DNI	104	59 (56.7)	102 (98.1)	40/45 (88.9)
blink	DNI	99	84 (84.8)	98 (89.0)	14/15 (93.3)
carve (figure, decoration)	INI	47	4 (8.5)	22 (46.8)	17/43 (39.5)
contribute (Recipient)	DNI	122	23 (18.9)	83 (68.2)	60/99 (60.6)
contribute (Theme)	INI	122	86 (70.5)	117 (95.9)	32/36 (88.9)
cross	DNI	141	25 (17.7)	122 (86.5)	97/116 (83.6)
donate (Theme)	INI	201	9 (4.5)	141 (70.2)	132/192 (68.7)
donate (Recipient)	DNI	159	77 (48.4)	143 (89.9)	66/82 (80.5)
dress	DNI	78	62 (79.5)	77 (98.7)	15/16 (93.4)
eat	INI	125	96 (76.8)	111 (88.8)	15/29 (51.7)
enter	DNI	80	16 (20.0)	75 (93.7)	59/64 (92.1)
govern	DNI	60	20 (33.3)	53 (88.5)	33/40 (82.5)
grab	DNI	137	4 (2.9)	118 (86.1)	124/133 (93.2)
obey	DNI	188	43 (22.9)	143 (76.1)	100/145 (69.0)
pass (Exam)	DNI	22	4 (18.2)	17 (77.3)	13/18 (72.2)
pass (Landmark)	DNI	56	14 (25.0)	43 (76.7)	29/42 (69.0)
reap	INI	51	15 (29.4)	25 (49.0)	16/36 (44.4)
shrug	DNI	112	100 (89.3)	112 (100.0)	12/12 (100.0)
spew (vomit)	INI	17	15 (88.2)	16 (94.1)	1/2 (50.0)
squeeze	DNI	76	11 (14.5)	74 (97.4)	63/65 (96.9)

Table 1: Null complement type and overall definiteness for select lexical units

In all of these constructions, the omitted argument is interpreted anaphorically or deictically, and overt realizations of those arguments also must be, or predominantly are, definite. For instance, the dish to be prepared in a recipe context is highly accessible as the discourse topic (40), as are the product bearing a particular label (41), and the omitted subjects in diaries (42). Overt expressions of these referents would have to be morphologically definite, e.g., the best reconstruction of the subject of (41) is the definite NP *this product*.

However, the evidence is not so clear-cut for other constructions. In the case of the passive construction, omitted agents and causes receive an indefinite interpretation. The majority of overtly expressed *by*-phrases also tends to be indefinite but the margin seems to be a fairly slim one. In a random sample of 100 passives with overt *by*-phrase agents or causes taken from the British National Corpus, we found that 54 were indefinite and 46 definite. In a parallel

random sample of just *get*-passives, also taken from the BNC, the margin was reduced to 51 indefinite agents or causes versus 49 definite ones.[7] Given that for both samples the standard error for the sample percentage is about 5%, it may actually be the case that definite agents and causes constitute the majority of *by*-phrase agents and causes in the BNC. The overt instances of passives thus do not show a clear preference for a definite or indefinite agent or cause.

6 Narrow scope generalizations

The predictive generalization that we have offered in this paper is of limited scope, in two respects. First, it predicts only the construal type of an argument once omitted, and not which arguments are omissible or what predicators license omissible arguments. Second, it applies only when two conditions are met: the predicator belongs to a specific frame and it licenses the omission of a particular frame element.

It would of course be useful to predict which predicators allow null-instantiation of any of their arguments, and/or which kinds of arguments are omissible, as these broader generalizations would apply to larger sets of elements–all predicators, or all arguments with certain characteristics. However, no reliable large-scale generalizations have thus far been found.

The selectional preference strength and the Aktionsart-based accounts that we discussed above seek large-scale generalization of this nature. Both make predictions about which types of arguments are omissible, and thereby, also implicit predictions about which predicates license NC. But recall that, as we showed above, while these accounts handle certain facts very nicely–the Aktionsart account, for example, captures the fact that objects in the resultative construction are generally not omissible–they also make many incorrect predictions. For instance, the selectional preference strength account incorrectly predicts the interpretation of *know* as INI rather than DNI, based on the predicate's narrow selectional preference for propositions.

As discussed by Ruppenhofer (2004: Chapter 4), there are other potential bases for predicting which kinds of arguments are omissible. For instance, the thematic role of an argument–in the sense of the small set of universal semantic roles posited by Gruber (1965) and Fillmore (1968)–appears to be a key source of generalizations about null instantiation that would cut across both lexeme classes and frames. Curiously, semantic-role based generalizations have not been discussed in the literature on null complementation. Fillmore (1986) notes only that Patients (or Themes) do not seem readily omissible. From the examples he discusses it is clear, however, that thematic roles do not allow generalizations about null instantiation. As shown by the following contrast sets involving instances of the classic thematic-role types Source, Experiencer and Recipient, respectively, we cannot predict for all instances of these roles either omissibility or intepretation type under omission.

[7]Both samples were produced by looking for all past participle tokens, identified via the PennTreeBank part-of-speech tag VVN, followed by the preposition *by* within 5 words; in the case of the *get*-passives, the participle also had to be immediately preceded by a form of *get*. The candidates were randomized and then inspected manually to eliminate accidental matches such as *had sat by the river* or *got defeated by a large margin*.

(43) Source

a. Sue **arrived** in Rome $\varnothing_{Source}$. (existential)

b. Sue **left** $\varnothing_{Source}$. (anaphoric)

c. Oil **exuded** *(from Myrna's hands$_{Source}$).

(44) Experiencer

a. This building is famously **confusing** $\emptyset_{Experiencer}$. (existential)

b. Recently - by this i mean around a month or so, my ears started **hurting** $\varnothing_{Experiencer}$ a lot. (anaphoric)

c. He **strikes** *(me$_{Experiencer}$) as a rather shy private fellow.

(45) Recipient

a. That guy's **distributing** free movie tickets $\varnothing_{Recipient}$. (existential)

b. I **donated** $20 $\varnothing_{Recipient}$. (anaphoric)

c. I **handed** $20 *(to her$_{Recipient}$).

The morphosyntax of the argument might also appear to be a profitable place to look for generalizations: it might be the case that phrases of a certain type are always omissible. A few examples will suffice to show, however, that phrase type does not predict omissibility. The examples in (46a-c) show, for instance, that some object NPs are omissible (46a-b), while others are not (46c), and that those objects that are omissible do not all share the same interpretation type: while the object of *knit* in (46a) is omitted under INI, that of *win* in (46b) is omitted under DNI. Example (47) provides parallel evidence for *that*-complement clauses.

(46) Object NPs

a. Sue's **knitting** (something) (existential)

b. I **won** (the game) (anaphoric)

c. I **found** *(the ring).

(47) *That*-complement clauses

a. I have had such a hard life, but still I **hope**. (existential)

b. I **know** (that he said that). (anaphoric)

c. He **blurted out** *(that he wanted to take Stein out that evening).

Other possible generalizations about null instantiation that are explored in Ruppenhofer (2004) involve the lemma frequency of predicators, their degree of polysemy, the definiteness profiles of arguments (as described in section 5 above), verb neutrality and the taxonomic level of the complement's referent. None of these were found to allow a larger generalization about null instantiation.

But these failures need not be discouraging, insofar as we are dealing with an aspect of argument realization licensed by lexemes, which may differ from one another in idiosyncratic ways, as revealed by synonym-differentiation exercises

involving pairs like *mislead* and *deceive* and *accomplish* and *achieve*. The lexicon is designed to provide alternative argument-encoding options for a given event-structure representation, as in the contrast between the verbs *transform* and *create*, on the one hand, and *replace* and *substitute*, on the other. It is thus not surprising that argument-omission generalizations should also be tied to lexical entries and their frame-based subgroupings.

7 Conclusion

In this paper we have argued that, faced with the idiosyncrasies of null-complementation phenomena, one should look for narrow-scope generalizations to gain predictive power. Our specific contribution was to propose an implicational regularity that predicts a uniform interpretation type for a given frame element across all lexical units of the frame that allow the FE's omission. We have argued that our framal analysis has better coverage and accuracy than explanations targeting general linguistic features like Aktionsart or selectional strength, which correlate with argument omission for some lexical classes. Finally, we have provided some preliminary motivation for why the interpretation type of null-instantiated arguments is what it is, by observing the correlation between the dominant definiteness value of overt instances and the interpretation type of omitted arguments. Finally, we have argued that null-complementation phenomena do not lend themselves to more general predictions than the one we have provided. In particular, we have argued that neither the construal of a complement when unrealized nor the null-complementation affordance itself can be predicted from general properties like lexical-class membership or semantic-role type. The moral of this story is that predictive principles must allow for lexical idiosyncrasy even while acknowledging semantic regularities like frame-based organization.

References

Brisson, Christine. 1994. The Licensing of Unexpressed Objects in English Verbs. *CLS* 30.90–102.

Fillmore, Charles J. 1968. The Case for Case. In *Universals in Linguistic Theory*, ed. by E. Bach & R. Harms, 1–88. New York: Holt, Rinehart & Winston.

—— 1982. Frame Semantics. In *Linguistics in the Morning Calm*, ed. by Linguistic Society of Korea, 111–38. Seoul: Hanshin.

—— 1985. Frames and the semantics of understanding. *Quaderni di Semantics* 6.222–254.

—— 1986. Pragmatically Controlled Zero Anaphora. *Berkeley Linguistics Society* 12.95–107.

Gillon, Brendan. submitted. Model theoretic semantics for implicit complements in english. *Linguistics and Philosophy* .

Goldberg, Adele E. 2006. *Constructions at Work*. Oxford, UK: Oxford University Press.

Gruber, Jeffrey, 1965. *Studies in lexical relations*. Cambridge, MA: M.I.T dissertation.

Ioup, Georgette. 1975. Some Universals of Quantifier Scope. In *Syntax and Semantics*, ed. by J. Kimball, volume 4, 37–58. Academic Press.

Lambrecht, Knud. 1995. The pragmatics of case. In *Essays in Semantics and Pragmatics*, ed. by Masayoshi Shibatani & Sandra A. Thompson, 145–190. Amsterdam/Philadelphia: John Benjamins.

Michaelis, Laura A., & Hartwell S. Francis. 2007. Lexical subjects and the conflation strategy. In *Topics in the Grammar-Pragmatics Interface: Papers in Honor of Jeanette K. Gundel*, ed. by Nancy Hedberg & Ronald Zacharski, 19–48. Amsterdam: John Benjamins.

Rappaport Hovav, Malka, & Beth Levin. 1998. Building Verb Meanings. In *The Projection of Arguments: Lexical and Compositional Factors*, ed. by Miriam Butt & Wilhelm Geuder, 97–134. Stanford: CSLI.

Resnik, Philip, 1993. *Selection and information: A class-based approach to lexical relationships*. Philadelphia: University of Pennsylvania dissertation. ftp://ftp.cis.upenn.edu/pub/ircs/tr/93-42.ps.Z.

——. 1996. Selectional constraints: An information-theoretic model and its computational realization. *Cognition* 61.127–59.

Ruppenhofer, Josef, 2004. *The interaction of valence and information structure*. Berkeley: University of California dissertation.

——, Michael Ellsworth, Miriam R. L. Petruck, Christopher R. Johnson, & Jan Scheffczyk, 2006. *FrameNet II: Extended Theory and Practice*. ICSI, Berkeley, CA. http://framenet.icsi.berkeley.edu/book/book.html.

Wright, Saundra, & Beth Levin, 2000. Unspecified object contexts with activity and change of state verbs. Paper presented at the LSA Annual Meeting, Chicago.