Unrealized arguments in SBCG

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Proceedings of the 27th International Conference on
Head-Driven Phrase Structure Grammar

Online (Berlin/Seattle)

Stefan Müller, Anke Holler (Editors)

2020

Stanford, CA: CSLI Publications

pages 47–67

Keywords: Sign-Based Construction Grammar, Frames, Null Instantiation.

Chaves, Rui P., Paul Kay & Laura A. Michaelis. 2020. Unrealized arguments in SBCG. In Stefan Müller & Anke Holler (eds.), *Proceedings of the 27th International Conference on Head-Driven Phrase Structure Grammar, Online (Berlin/Seattle)*, 47–67. Stanford, CA: CSLI Publications. DOI: 10.21248/hpsg.2020.3.

Abstract

In null instantiation (NI) an optionally unexpressed argument receives either anaphoric or existential interpretation (Fillmore, 1986; Mauner & Koenig, 2000; Kay, 2002; Ruppenhofer & Michaelis, 2010, 2014). Examples include Lexically licensed NI (*Nixon resigned* ∅), Contextual accessibility NI (*Can I see* ∅*?*), Labelese (∅ *contains alcohol*), Diary NI (∅ *got up,* ∅ *got out of bed,* ∅ *dragged a comb across my head*), Generic-habitual NI (*The police only arrest* (*people*) *when there's probable cause*). We think of a predicator as having NI potential when one or more of its frame elements may remain unexpressed under certain conditions. One cannot accurately predict a predicator's NI potential based either on semantic factors (e.g., Aktionsart class of the verb, as in Hovav & Levin (1998)) or pragmatic factors (e.g., relative discourse prominence of arguments, as in Goldberg (2006)), but NI potential, while highly constrained, is not simply lexical idiosyncrasy. It is instead the product of both lexical and constructional licensing. In the latter case, a construction can endow a verb with NI potential that it would not otherwise have. Using representational tools of Sign Based Construction Grammar (Sag 2012, a.o), we offer a lexical treatment of null instantiation that covers both distinct patterns of construal of null instantiated arguments and the difference between listeme-based and contextually licensed, thus construction-based, null complementation.

1 Introduction

The basic architecture of Sign-Based Construction Grammar (SBCG) set out in Sag (2012) goes a considerable distance in covering the phenomena of arguments that are not locally realized, but less than the whole way. Our purpose here is to fill out the empirical and theoretical coverage of locally unrealized arguments in SBCG. Sag (2012) briefly mentions the phenomenon of null instantiation (NI), in which an optionally unexpressed argument receives either anaphoric or existential interpretation, citing Fillmore (1986, 86), but does not provide either empirical details or an SBCG implementation.[1] Section 2 provides a lexical treatment of null instantiation that covers both distinct patterns of construal of null instantiated arguments and the difference between listeme-based and contextually licensed, thus construction-based, null complementation. Our treatment does not rely on the sign types *gap* or *pro*, which Sag (2012) lists in the type hierarchy. Neither type is mentioned in that text; *pro* appears once in the representation of a *construct* (a model object). We specify that the members of the VALence list and the GAP list are

[†]We thank the audience of the 2020 HPSG conference for their comments and questions, in particular Emily Bender and Guy Emerson. We are grateful as well to Jean-Pierre Koenig for helpful discussion and comments on an earlier version of this work. As usual, all are exculpated from lingering mistakes and shortcomings.

[1]Prior accounts of argument optionality are generally purely syntactic, saying little about the semantics and pragmatics of NI; see Müller & Ghayoomi (2010) for example.

simply signs. There are also signs that appear on a predicator's ARGument-STructure list that do not appear on the VAL or GAP lists but rather are realized morphologically.[2]

2 Null Instantiation

Fillmore (1986) notes two distinct kinds of null instantiation (NI) of arguments: indefinite null instantiation INI and definite null instantiation DNI. INI may be viewed in the first instance as a kind of lexically constrained convention of existential import. If I say, "I have contributed to the Red Cross", I have said enough to indicate that I contributed **something**, usually a sum of money or goods of some kind, to the Red Cross. I don't have to mention the stuff of any contribution. In effect I have said that there is some stuff x such that I have contributed x to the Red Cross. On the other hand, if I say, "I contributed $25", my utterance is only felicitous in a context in which I can take for granted that my addressee can identify the entity to which I made the contribution. The latter example illustrates DNI.[3] Fillmore emphasizes the lexical idiosyncrasy of null complementation (in English), writing:

> 'It is possible to find closely synonymous words, some of which permit definite null complements while others do not. To mention just one example, we can see that INSIST allows its complement to be absent under the relevant conditions, but many of its near-synonyms do not. Thus, a possible reply to WHY DID YOU MARRY HER? might be (10), but not (11) or (12) [Boldface example numbers are those of the original].
>
> **(10)** BECAUSE MOTHER INSISTED
>
> **(11)** *BECAUSE MOTHER REQUIRED
>
> **(12)** *BECAUSE MOTHER DEMANDED (Fillmore, 1986, 98)

Fillmore (1986, 99) gives an additional dozen or so examples of fairly close synonyms that display conflicting null complementation potentials. However, as Fillmore also notes, semantics is not uniformly uncorrelated with null complement potential. For example, the verb *give* has the null complement potential of *contribute* only when it is employed with the sense of *contribute*. Thus, one can say (13a) but not (13b).

(13) a. I gave to my NPR station this year.

b. *I gave to my niece on her birthday.

[2]For such signs Sag cites the standard treatment of Romance pronominal 'clitics' as verbal affixes (e.g., Miller & Monachesi (2003), and we have no reason to revise that.

[3]It is possible that 'definiteness', in the context of null instantiation at least, is more aptly conceived as gradient than dichotomous. We return to that question below.

Fillmore makes the point that *give* has the same NI potential as *contribute* only when *give* is used in the sense of *contribute*. Lest one conclude from that and similar observations that semantics is a reliable predictor of NI potential, consider the semantically and syntactically related *donate*, *bequeath*, and *bestow*. *Donate* shares with *contribute* the potential of INI for the theme argument but not the DNI potential for the recipient argument. *Bequeath* and *bestow* share none of these NI possibilities.

Fillmore (1986) is concerned exclusively with null complementation that is licensed by particular lexemes. We consider this aspect of the phenomenon first. Null complementation has also been shown to be licensed by certain aspects of discourse context, e.g. genre (Ruppenhofer & Michaelis, 2010, 2014) [R&M], which is considered in Section 2.2.

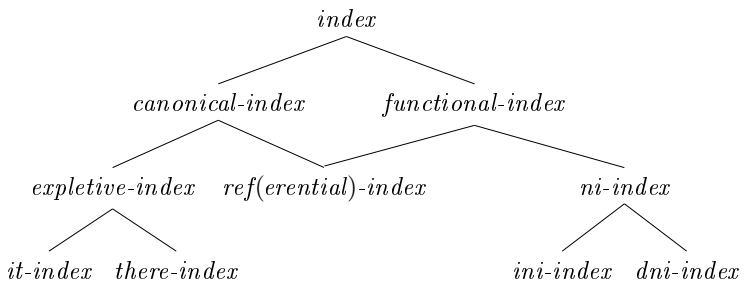
2.1 Lexically Licensed Null Instantiation

Usually or always, lexically licensed null instantiation occurs as an option to overt instantiation.[4] Consider again the English verb contribute. Since the object is optionally subject to INI and the PP complement to DNI, one has paradigmatic examples like (1).

(1) a. I will contribute ten dollars to your campaign.
b. I will contribute _[something] to your campaign.
c. I will contribute ten dollars _[to you know what].
d. I will contribute _[something] _[to you know what].

To account grammatically for the kind of variation displayed in (1) one could posit four distinct listemes *contribute*. That approach would fail to capture the generalization of optionality in an explicit fashion. In order to represent the optionality of NI more perspicuously, we further refine the taxonomy of semantic indices in (2).

(2)

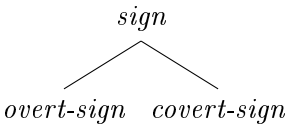


[4]In accordance with FrameNet annotation practice, verbs like *sweat, piss, pee, belch, burb, bleed*, etc. may be considered to represent obligatory, or at least highly preferred, null instantiation of the Excreta frame element. We do not pursue the possibility of truly obligatory null complementation, which in any case would require no analysis beyond that required for the semantic interpretation of the NI option, as proposed in section 2.4.

The interpretation of signs bearing *ini-index* or *dni-index* is discussed in section 2.4. We model an INDEX as a feature structure with an AGReement feature (Pollard & Sag, 1994; Wechsler & Zlatic, 2003)) and, where appropriate, a discourse referent VAR(iable) feature analogous to that of DR in Iordăchioaia & Richter (2015); see also Koenig & Richter (2020). For example, the relevant part of the entry for the pronoun *she* with discourse variable x is represented in (3). The types *expletive-index* are specified as [VAR *none*].

(3)
$$\begin{bmatrix} \text{INDEX} & \begin{bmatrix} \textit{ref-index} & \\ \text{AGR} & \begin{bmatrix} \text{PER} & \textit{3rd} \\ \text{NUM} & \textit{sing} \\ \text{GEN} & \textit{fem} \end{bmatrix} \\ \text{VAR } x & \end{bmatrix} \end{bmatrix}$$

Signs are sorted by the type of index they contain. Consider the type hierarchy in (4) and the constraints in (5). Overt signs contain canonical indices; covert signs may contain a *dni-index*, *ini-index* or *referential-index*.

(4)


(5) a. *overt-sign* ⇒ [SEM [INDEX *canon-index*]]
b. *covert-sign* ⇒ [SEM [INDEX *functional-index*]]

Thus, indices of the type *canonical-index* appear in overt signs, signs that are realized as syntactic daughters. These include signs bearing the two expletive indices *it-index* and *there-index*, as well as the most common index type, *ref(erential)-index*. Functional indices are those that have semantic content; they include in addition to *ref-index*, signs bearing the two null instantiation index types *ini-index* and *dni-index*.

Overt signs have the full set of features introduced in Sag (2012: 180), including the features FORM and PHONology. Covert signs do not.

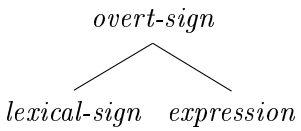
(6) a.
$$\textit{sign} : \begin{bmatrix} \text{SYN} & \textit{syn-object} \\ \text{SEM} & \textit{linguistic-meaning} \\ \text{CNTXT} & \textit{context-object} \end{bmatrix}$$

b.
$$\textit{overt-sign} : \begin{bmatrix} \text{PHON} & \textit{phon-object} \\ \text{FORM} & \textit{morph-object} \end{bmatrix}$$

Sag (2012:178) does not recognize the distinction encoded in (4)-(6) and in the sign hierarchy specifies that *lexical-sign* and *expression* are the immediate subtypes of *sign*. In view of the overt/covert distinction, we amend

the *sign* hierarchy to designate *lexical-sign* and *expression* as the immediate subtypes of *overt-sign*, as seen in (7).

(7)



The daughters of syntactic phrasal constructions in SBCG are required to be typed as *overt-sign*, that is, as words or phrases (Sag 2012:145). Lexemes, therefore, have to undergo inflection, possibly zero inflection, to be expressed as the daughters of phrases, and so play a role in utterances. We reformulate the Argument Realization Principle (ARP) as seen in (8).

(8) **Argument Realization Principle Construction** (↑*lexical-sign*)

$$word \Rightarrow \begin{bmatrix} \textsc{arg-st} & L_1 \bigcirc L_2 \bigcirc list\Big(covert\text{-}sign\big[\textsc{index}\ ni\text{-}index\big]\Big) \\ \textsc{syn} & \begin{bmatrix} \textsc{val} & L_1 \\ \textsc{gap} & L_2 \end{bmatrix} \end{bmatrix}$$

The ARG-ST list is non-deterministically split into three sub-lists using the sequence union relation '◯' (Reape, 1996; Kathol, 2001), each of which may or may not be empty. VAL is the list of locally realized arguments, GAP is the list of extracted arguments, and the third sub-list can only contain null instantiation arguments, which are neither locally realized nor extracted. However, there are no INDEX constraints on either VAL or GAP, which means that it is possible for an *ni-index* sign to appear in either VAL or GAP instead of the third sub-list. Occurrence of an *ni-index* sign in GAP licenses sentences in which the null instantiated sign is extracted (but not realized as a constituent), as in (9a), which we discuss later in §2.3. Analogously, occurrence of a sign typed *covert-sign* and with index *ref-index* sign in VAL licenses cases where valent is controlled, as in the case of the subject valent of the VP *go into a cup* in (9b).[5]

(9) a. $\emptyset_i$ Don't be so hard to get $\__i$, baby.
[Rick James, *You and I*]

b. I [made [the top]$_i$ [$\emptyset_i$ go into a cup]].

If a null instantiation sign appears in VAL it cannot be realized overtly because only *canon-index* signs are allowed to appear in DTRS. To this end, we reformulate Sag's (2012:106) type constraint over constructs as shown in

[5]More specifically, control verbs like *make* will bear the following specification: [ARG-ST ⟨NP[INDEX X], NP[INDEX Y], VP[VAL ⟨*covert-sign*[INDEX Y]⟩]⟩].

(10).[6] This type declaration ensures that all overt phrases in English are canonical, that is, either *referential, it*, or *there*.

(10) **Type declaration for** *construct*

$$\textit{construct} : \begin{bmatrix} \text{MTR} & \textit{overt-sign} \\ \text{DTRS} & \textit{ne-list}(\textit{overt-sign}) \end{bmatrix}$$

The constraints in (8) and (10) interact to prevent any *ini-index* or *dni-index* sign from being discharged from either VAL or GAP as a member of DTRS. In this indirect sense, *ni-index* signs are not viable members of VAL. Thus, the word *contribute* will be compatible with the four uses that appear in (1a-d), which correspond to the argument structures appearing in (11a-d).

(11) a. [ARG-ST ⟨NP[INDEX *ref-index*], NP[INDEX *ref-index*], PP[INDEX *ref-index*]⟩]
b. [ARG-ST ⟨NP[INDEX *ref-index*], NP[INDEX *ini-index*], PP[INDEX *ref-index*]⟩]
c. [ARG-ST ⟨NP[INDEX *ref-index*], NP[INDEX *ref-index*], PP[INDEX *dni-index*]⟩]
d. [ARG-ST ⟨NP[INDEX *ref-index*], NP[INDEX *ini-index*], PP[INDEX *dni-index*]⟩]

As in HPSG, the members of ARG-ST appear in order of increasing obliqueness, reflecting Keenan and Comrie's Accessibility Hierarchy. In the case of English, the first member of a verbal ARG-ST list is the EXTERNAL ARGUMENT (XARG) (12) and has a number of special properties.

(12) $$\textit{v-lxm} \Rightarrow \begin{bmatrix} \text{ARG-ST} & \langle X, ... \rangle \\ \text{SYN} & \begin{bmatrix} \text{CAT} \begin{bmatrix} \text{XARG } X \end{bmatrix} \end{bmatrix} \end{bmatrix}$$

The XARG is the only argument that can bear nominative case, is suppressed in passive although optionally available as an oblique complement headed by the preposition *by*, appears immediately postverbally in inverted clauses, serves as the target of control and raising, binds the pronominal subject of a sentence tag (13a), participates in the binding relation between an absolute subject and an element of the main clause (13b,c), etc. The last two properties illustrate the fact that the XARG is the only argument that can participate in a dependency with an item outside its clause.[7]

(13) a. The guests$_i$ left, didn't they$_i$?

[6] Like HPSG, SBSG distinguishes a *signature*, which sets out the basic types (classes of feature structures) of a grammar, as distinct from the rules or constructions that operate on those types. The decision whether to cast a particular generalization as a type declaration of the signature or as a construction of the *constructicon* (Sag 2012:103 *et passim*) is sometimes a matter of choice. In SBCG, type declarations are expressed with a colon between the name of a type and a constraint that the type must satisfy, analogously to the role of the double-shafted arrow in constructions.

[7] The possible values of XARG are *sign* and *none*. The XARG of an NP, if there is one, is the genitive determiner, which is enforced by a further lexemic constraint.

b. $\emptyset_1$ having caught sight of each other$_i$, the kids$_i$ started laughing.

c. Which kid$_i$ did you say that – with his$_i$ parents out of town – $\_\_i$ would not be too hard to convince $\_\_i$ to host a party?

The ARG-ST feature is restricted to *lexical signs*, that is, *lexemes* and *words*, but the XARG, as a CATegory feature (analogous to the HEAD feature of GPSG/HPSG) is visible at all levels of a headed *phrase*.

We formulate an illustrative lexical entry (listeme) for *contribute* that resolves to just the four possibilities shown in (11). We assume that the frame arguments appear in a list ARGS, instead of the usual features (e.g. a SITuation (event variable) feature, and constituent features DONOR, GIFT, and RECIPIENT). This list encoding is chosen mainly as a convenient way to describe the linkage between ARG-ST members and the NI rules to be described below, though nothing hinges on this.[8] Thus, the *contribute-frame* is encoded as in Predicate Logic, as *contribute*(s,x,y,z), where s is a situation, x is the donor, y is the gift, and z is the recipient, respectively. These arguments will all require their values to bear functional indices, ruling out expletive values. Taking note of that fact, a simplified lexical entry for *contribute* is shown in (14).

(14)
$$\left[\begin{array}{l} \textit{contribute-lexeme} \\ \textsc{form}\ \langle \textit{contribute} \rangle \\ \textsc{sem}\left[\begin{array}{ll} \textsc{index} & s : \textit{ref-index} \\ \textsc{frames} & \left\langle \left[\begin{array}{l} \textit{contribute-fr} \\ \textsc{sit}\quad s \\ \textsc{args}\ \langle\ \textit{ref-index},\ \neg \textit{dni-index},\ \neg \textit{ini-index}\ \rangle \end{array}\right] \right\rangle \end{array}\right] \end{array}\right]$$

We follow Sag et al. (2003, 241) and Ginzburg & Sag (2000, 21) in assuming that the hierarchical lexicon is responsible for instantiating ARG-ST values in lexemes. We also assume that the hierarchical lexicon is responsible for linking the indices in FRAMES to the appropriate arguments, as illustrated in (15), for prepositional transitive verbal lexemes like *contribute* in (14). Standard derivational (lexeme-to-lexeme) rules license derived lexeme uses that belong to different classes and therefore can obtain different values for ARG-ST and for ARGS.

(15)
$$\textit{ptv-lxm} \Rightarrow \left[\begin{array}{l} \textsc{arg-st}\left\langle \mathrm{XP}[\textsc{index}\ X],\ \mathrm{NP}[\textsc{index}\ Y],\ \mathrm{PP}[\textsc{index}\ Z] \right\rangle \\ \textsc{sem} \mid \textsc{frames}\left\langle \left[\textsc{args}\ \langle X, Y, Z \rangle\right] \right\rangle \end{array}\right]$$

[8] An alternative formulation would use variables over constituent features, along the lines of Koenig & Davis (2003).

2.2 NI Licensed by Context

We have so far considered only null instantiation that comes with a listeme. There are also cases in which features of the discourse context, including narrative context and shared background knowledge, allow a predicator to exhibit null-instantiation potential it does not possess inherently. The verb *pull* does not, in general, license DNI, as illustrated in the following excerpt from a hearing of a commission of the U.S. Congress.

(16) Mr. Blanton: Had your little girl pulled this fire-alarm box that you know of?
Mr. Puliam: No, sir; and nobody had seen her pull *(it).
Mr. Blanton: And they just suspected she had pulled *(it)?
Mr. Puliam: The fire-alarm box had been pulled and my children were seen around there.
Mr. Blanton: And the child could have pulled *(it)?
Mr, Pulliam: Yes, sir.
Mr. Blanton: And there are some 66,000 other children in the District who could have pulled *(it)?

However, in a situation of sufficient immediacy and salience, the object of a verb like *pull* or *push*, which does not inherently license DNI, may be implicit. Attested examples (17a-c) illustrate DNI of this kind.

(17) a. I leaped to my feet and stumbled toward her. My fingers grabbed for the deadly necklace. I pulled with all my strength. Snap! (R.L. Stine. (undated) *Camp Fear Ghouls*. Simon & Schuster: New York: pages unnumbered. [Google Books])
b. Ernesto pointed again to the rocks. "Learn not to push before the right moment," he said. (Sylvester Stein (1958) *Second-Class Taxi*. Africasouth Paperbacks. Cape Town [Google Books].)
c. Suddenly the boulder was rocking and Tola Beg pushed hard, pushed with all the strength he had in his old body and with all the strength he had in his mind. Louis L'Amour (2001) *May there be a road*. Bantam Books: New York. page 36.

We take the key concept at work in licensing this kind of NI to be the *accessibility* of an intended referent (Ariel, 2001; Gregory & Michaelis, 2001). As the name suggests, accessibility is conceived as a gradient property: the degree to which "the speaker can predict or could have predicted that a particular linguistic item will or would occur in a particular position within a sentence" (Prince, 1981, 226). We posit that in any utterance context there is a threshold degree d of accessibility such that when the degree of accessibility of a valent v equals or exceeds d, DNI is licensed for v. The ACCESSIBLE feature, however, is discrete; its value is either the VARiable x of the INDEX of

a valent whose degree of accessibility v equals or exceeds the threshold d of *none*. An index appears on the ACCESSIBLE list iff its degree of accessibility equals or exceeds the threshold.[9] The ACCESSIBLE feature is posited to be one of the CONTEXTUAL-INDEX (C-IND) features (See Sag (2012: 96), Pollard & Sag (1994, 332-335) for discussion of C-INDS). The Accessibility DNI Construction is a derivational construction, mapping lexemes to other lexemes. When the intended referent of a valent is sufficiently accessible in the context, the construction pumps the predicator word in question to an otherwise identical word in which the argument is interpreted as DNI.

The Accessibility DNI Construction is shown in (18). As noted the ACCESSible feature takes a variable as its value when the degree of accessibility exceeds the threshold and *none* otherwise.

(18) **Accessibility DNI Construction** (↑*derivational-cxt*)
accessible-dni-cxt ⇒

$$\left[\begin{array}{l}\textsc{mtr}\ X!\left[\textsc{sem}\ \left[\textsc{frames}\ \left\langle\left[\textsc{args}\ L_1\oplus\left\langle X!\left[\textit{dni-index}\right]\right\rangle\oplus L_2\right]\right\rangle\right]\right] \\ \textsc{dtrs}\left\langle X:\left[\begin{array}{l}\textsc{sem}\ \left[\textsc{frames}\ \left\langle\left[\textsc{args}\ L_1\oplus\left\langle X:\left[\begin{array}{l}\textit{ref-index}\\ \textsc{var}\ x\end{array}\right]\right\rangle\oplus L_2\right]\right\rangle\right] \\ \textsc{cntxt}\left[\textsc{access}\ x\right]\end{array}\right]\right\rangle\end{array}\right]$$

In construction (18) the value of CNTXT [C-INDS]] specifies that the accessibility of the intended referent of the argument [INDEX [VAR x]] is at or above threshold. Because linking constraints like (15) apply to lexemes, they apply to both the daughter and the mother of (18). Thus, on the daughter's ARG-ST list this sign will have a *ref-index*, while on the mother's ARG-ST list the otherwise identical sign has a *dni-index*. Both signs will have the same [VAR x] specification, since only the index type is altered by (18).

R&M note that generic, including habitual, aspect can license indefinite null instantiation of the direct object of a simple transitive verb, such as *arrest*, while this is not possible under other circumstance.

(19) a. * The cops arrested ∅ last night. [R&M's ex. (1), p. 159]
b. Sure, the cops arrest Ø when they can, but it's always in small amounts. [R&M's ex. (2), p. 159, attested]

Null complementation licensed by generic interpretation as exemplified in (19) is restricted to existence interpretation, INI (R&M: 164), and is

[9] We leave to future research the question whether the threshold of accessibility varies with utterance context or is in some sense constant. Also, it is also an open question whether accessibility is in fact observable independently of its inferred effect on utterances.

also restricted to non-subjects. We model these facts in the Generic INI Construction, formalized in (20).

(20) **Generic INI Construction** (↑ *derivational-cxt*)
generic-ini-cxt ⇒

$$\left[\begin{array}{l}\textsc{mtr}\ X!\left[\textsc{sem}\ \left[\textsc{frames}\ \left\langle\left[\textsc{args}\ L_1 \oplus \langle\ \textit{ini-index}\ \rangle \oplus L_2\right], \left[\textit{dispositional-fr}(s)\right]\right\rangle\right]\right] \\ \textsc{dtrs}\left\langle X\!:\left[\textsc{sem}\ \left[\begin{array}{l}\textsc{index}\ s \\ \textsc{frames}\ \left\langle\left[\textsc{args}\ L_1 :\textit{ne-list} \oplus\langle\ \textit{ref-index}\ \rangle \oplus L_2\right]\right\rangle\end{array}\right]\right]\right\rangle\end{array}\right]$$

In (20), a non-subject argument typed as *ref-index* is selected to become *ini-index*, regardless of the initial lexemic specification. The change to a non-canonical index forces the sign bearing it to become *covert-sign*, according to (5). The mother's FRAMES list contains a *dispositional-fr*(*ame*), representing a stativizing operator that takes an event argument and subsumes a quasi-universal operator over instances of a kind (Boneh, 2019). The value of VAR remains unchanged, and linking rules establish what the value of ARG-ST is in the mother lexeme. Linking rules imposing constraints on the ARG-ST and the frame arguments apply to the lexeme in MTR, and establish how the verbal frame arguments link to the signs in ARG-ST.

NI may also be licensed by genre. R&M show that NI is licensed by five distinct genres: instructional imperative, "labelese", dairy style, sports reporting ("match reports"), and certain non-quotative verbs used quotatively (See R&M: 160 for examples). For all five genres NI is of the deictic/anaphoric, i.e. DNI, variety and in some cases targets erstwhile subjects. Two examples of context-induced DNI are what R&M term labelese, e.g. (21a), and diary genre e.g. (21b).[10]

(21) a. ∅ Contains alcohol. (R&M's ex. (4), p. 160)
b. ∅ Read Michelet; ∅ wrote to Desmond about his poetess; ... ∅ played gramophone... (R&M's ex. (5), p. 160)

[10] Although genre-restricted subject ellipsis in languages that, like English, do not allow anaphoric subject ellipsis as a general matter has been well studied in relation to diary corpora (e.g. Haegeman & Ihsane (2001)), the phenomenon is not exclusively restricted to diary contexts. Example (i) is due to Richard Oehrle (p.c., cited in Kay (2002)). We do not attempt here to characterize the full range of conversational contexts permitting subject ellipsis in English, rather restrict the contextual constraint in the SBCG representation of the construction to diary genre, where it has been objectively established.

(i) [Baseball context] Got 'im, struck 'im out!

R&M note that in diary genre DNI involves the definite interpretation of an unrealized potential subject that is necessarily a topic. They propose a phrasal construction for diary genre DNI to license examples like those in (21). Here, we remain with the lexical approach, shown in (22).[11]

(22) **Diary Genre DNI Construction** (↑ *derivational-cxt*)
diary-dni-cxt ⇒

$$\left[\begin{array}{l}\textsc{mtr}\ X!\left[\textsc{sem}\ \left[\textsc{frames}\ \left\langle\left[\textsc{args}\ \langle\ \textit{dni-index}\ \rangle \oplus L\right]\right\rangle\right]\right] \\ \textsc{dtrs}\left\langle X\!:\left[\begin{array}{l}\textsc{sem}\ \left[\textsc{frames}\ \left\langle\left[\textsc{args}\ \left\langle\begin{bmatrix}\textit{ref-index}\\ \textsc{var}\ x\end{bmatrix}\right\rangle \oplus L\right]\right\rangle\right] \\ \textsc{cntxt}\ \left[\textsc{c-inds}\ \begin{bmatrix}\textsc{topic}\ x\\ \textsc{genre}\ \textit{diary}\end{bmatrix}\right]\end{array}\right]\right\rangle\end{array}\right]$$

In construction (22), the CNTXT value constrains TOPIC and GENRE features. The GENRE value is *diary* and the TOPIC value is identified with the subject referent x. The mother's value differs from that of the daughter in that the subject's index is *ref-index* in the daughter and *dni-index* in the mother.

The Instructional Imperative Construction is of interest because, along with DNI suppression of a non-subject argument, it includes the familiar unexpressed second person subject of imperatives:

(23) a. Method: Blend all the ingredients in an electric blender. Serve ∅ cold. [R&M ex. (3), p. 106]
b. Chill ∅ before serving ∅. [R&M unnumbered, p. 159]

R&M propose a phrasal construction. We continue here to pursue a lexical approach, treating these phenomena as licensed by lexical rules. We analyze the verbs *chill* and *serve* in (23a,b) as first having served as the unique daughter input to an inflectional construction whose mother is an ordinary imperative-verb, morphologically a plain-form (Huddleston & Pullum 2002, 83, [CGEL]) verb, whose XARG appears on neither the VAL nor GAP lists and is interpreted like a second person pronoun, along the lines of (24).

[11] Non-subject examples of Diary Genre NI are exist, but are rare. R&M also make the fact that the denotatum of the ellipted subject is a "volitional participant" a separate part of the representation of the construction. We assume that information is included in the specification of *diary* genre.

(24) **Imperative Construction** (↑ *derivational-cxt*)
imperative-cxt ⇒

$$\left[\begin{array}{l}\textsc{mtr}\ X!\left[\begin{array}{l}\textit{imper-lxm}\\ \textsc{syn}\ \left[\textsc{cat}\ \left[\textsc{vform}\ \textit{plain}\right]\right]\\ \textsc{sem}\ \left[\textsc{frames}\ \left\langle\left[\textsc{args}\ \langle\ Y:\textit{dni-index}\ \rangle\oplus L\right],\ \left[\begin{array}{l}\textit{imper-fr}\\ \textsc{sit}\quad s\\ \textsc{args}\ \langle Y\rangle\end{array}\right]\right\rangle\right]\\ \textsc{arg-st}\ \left\langle \mathrm{NP}\left[\textsc{agr}\ \textit{2nd}\right],\ \ldots\right\rangle\end{array}\right]\\ \textsc{dtrs}\left\langle X:\left[\begin{array}{l}\textsc{syn}\ \left[\textsc{cat}\ \left[\textsc{vform}\ \textit{base}\right]\right]\\ \textsc{sem}\ \left[\begin{array}{l}\textsc{index}\ s\\ \textsc{frames}\ \left\langle\left[\textsc{args}\ \left\langle\left[\begin{array}{l}\textit{ref-index}\\ \textsc{var}\ x\end{array}\right]\right\rangle\oplus L\right]\right\rangle\end{array}\right]\\ \textsc{cntxt}\ \left[\textsc{c-inds}\ \left[\textsc{addressee}\ x\right]\right]\end{array}\right]\right\rangle\end{array}\right]$$

In (24) the subject is changed from referential to DNI, although it has the same variable specification [VAR x]. The definition of construct in (10) prevents the subject from being realized overtly because of its INDEX type, but it remains available on the ARG-ST to bind an anaphor, if necessary, as in (25). We assume imperative semantics consists in a relation between an individual Y (the understood second person subject) and a state of affairs s, as indicated in the mother's FRAMES in (24). Other possibilities exist.

(25) $\emptyset_i$ Protect yourself$_i$ from 5G.

The Instructional Imperative Construction, exemplified in (26) and formalized in (27), is a construction whose daughter is an imperative verb lexeme, that is, the output (MTR) of the Imperative Construction in (24).

(26) a. In a bowl, toss Ø with salt and set Ø aside. (R&M: 72)
b. In a skillet, sauté Ø until browned but not crisp. (R&M: 72)

The MTR in the Instructional Imperative Construction retains the characteristics of an imperative verb word that contains a referential non-subject argument while replacing the index of that argument with *dni-index*. Specifically, in the Instructional Imperative Construction (24); (i) there is a pair of non-XARG ARG-ST members distributed across mother and daughter that are alike in having [VAR x] in their INDEX but differ in their INDEX type, (ii) in the daughter's ARG-ST, the INDEX type of the [VAR x] argument is

ref-index while that in the mother's ARG-ST is *dni-index*, (iii) the x variable is contextually specified to be a TOPIC and (iv) the GENRE is contextually specified to be *instruction*(*al*).

(27) **Instructional Imperative DNI Construction** (↑*derivational-cxt*)
instructional-imperative-dni-cxt ⇒

$$\left[\begin{array}{l}\textsc{mtr}\ X!\left[\textsc{sem}\ \left[\textsc{frames}\ \left\langle\left[\textsc{args}\ L_1 \oplus \langle\ \textit{dni-index}\ \rangle\right], Y\right\rangle\right]\right] \\ \textsc{dtrs}\left\langle X\colon \left[\begin{array}{l}\textit{imper-lxm} \\ \textsc{sem}\ \left[\textsc{frames}\ \left\langle\left[\textsc{args}\ L_1 \oplus \left\langle\begin{bmatrix}\textit{ref-index}\\ \textsc{var}\ x\end{bmatrix}\right\rangle \oplus L_2\right], Y\right\rangle\right] \\ \textsc{cntxt}\ \left[\textsc{c-inds}\ \begin{bmatrix}\textsc{topic}\ x \\ \textsc{genre}\ \textit{instruction}\end{bmatrix}\right]\end{array}\right]\right\rangle\end{array}\right]$$

2.3 NI and Displacement

Not all extraction requires a filler phrase, and thus in some cases the missing argument is simply missing, although it can be co-indexed with another null instantiated phrase. In examples (28a) and (28b) the subject is null and co-indexed with the extracted object.

(28) a. ∅ Don't be so hard to please _.
(Huddleston & Pullum, 2002, 1086)
b. ∅ Being especially easy to talk to _, Pat was able to escape being laid off.

Sag (2012) adopts a feature-based approach to argument realization in which members of ARG-ST are allowed to appear either in VAL(ence) or in GAP. Members of ARG-ST that appear in GAP are percolated in syntactic structure to license potentially long-distance dependencies, whereas those members of ARG-ST that appear in VAL must be locally realized. However, Sag (2012) is not entirely clear about how members of ARG-ST are related to VAL and GAP; in particular, how subjects are mapped into GAP. Sag (2012) cites the Ginzburg & Sag (2000) analysis, which accounts for subject extraction via a different mechanism from that of object extraction, but in the light of Levine & Hukari (2006, 87–109), extraction of subjects and complements should be handled uniformly. Technical details aside, not only does the exact account that Sag (2012) had in mind remain unclear, but it also is not clear how null instantiation may be factored into this picture.

In fact, the construction (29) from Sag (2012, 152), which is responsible for allowing heads to combine with complements (the Predicational Head-Complement Construction PHCC) has a fundamental problem. The PHCC

is dedicated to licensing all phrases in which the non-subject VALence requirements of a predicator are realized as sisters to the head in all VPs and relevant PPs, APs and NPs.

(29) **Predicational Head-Complement Construction** (↑*headed-cxt*) [according to Sag 2012, 152, item (112)]

$$\textit{pred-hd-comp-cxt} \Rightarrow \begin{bmatrix} \textsc{mtr} & \left[\textsc{syn}\ X!\left[\textsc{val}\ \langle X \rangle\right]\right] \\ \textsc{dtrs} & \langle Z \rangle \oplus L : \textit{ne-list} \\ \textsc{hd-dtr}\ Z : & \begin{bmatrix} \textit{word} \\ \textsc{syn}\ X : \begin{bmatrix} \textsc{cat}\ \left[\textsc{xarg}\ Y\right] \\ \textsc{val}\ \langle Y \rangle \oplus L \end{bmatrix} \end{bmatrix} \end{bmatrix}$$

In the head daughter of (29), the external argument, tagged Y, appears on the daughter's VAL list (Sag 2012: 152). Since this sign is also on the VAL list of the mother, it cannot also be a member of the mother's GAP list under any conception of the ARP. So extraction of the external argument and realization of a non-subject complement cannot cooccur, which is problematic. One approach to this problem would be to revert to distinct SUBJ and COMPS features, but since the problem arises only in the operation of the PHCC, parsimony dictates altering only the PHCC itself to allow co-occurring realization of complements and extraction of the subject.

We propose the update of the PHCC seen in (30), to permit co-occurrence of subject extraction and overt realization of non-subject complements.

(30) **Predicational Head-Complement Construction** (↑*headed-cxt*) [revised]

$$\textit{pred-hd-comp-cxt} \Rightarrow \begin{bmatrix} \textsc{mtr} & \left[\textsc{syn}\ X!\left[\textsc{val}\ L_1\right]\right] \\ \textsc{dtrs} & \langle X \rangle \oplus L_2 : \textit{ne-list} \\ \textsc{hd-dtr}\ Z : & \begin{bmatrix} \textit{word} \\ \textsc{syn}\ X : \begin{bmatrix} \textsc{cat}\ \left[\textsc{xarg}\ Y\right] \\ \textsc{val}\ L_1 : \langle (Y) \rangle \oplus L_2 : \textit{list}(\neg Y) \end{bmatrix} \end{bmatrix} \end{bmatrix}$$

The revised PHCC in (30) avoids the blocking of XARG extraction, imposed by the unrevised PHCC (29) by specifying the first member of the VAL list of the HD-DTR to be the XARG optionally, as against obligatorily as in (29). In (30) the optionality reappears on the MTR's VAL list, which is consequently specified to be either (i) the singleton list containing the XARG or (ii) the empty list, depending on whether or not the XARG-initial option of the HD-DTR's VAL list is exercised. If the former option is followed the XARG is

realized locally; if the latter, the XARG appears on the MTR's GAP list and is normally realized as the filler constituent in a filler-head-construct.

The further specification of the HD-DTR's VAL list as "$\oplus L_2$*:list*$(\neg Y)$" ensures that when the XARG occurs on the HD-DTR's VAL list it occurs only as the first member, in L_1. The parametric type L_2 *:list*$(\neg Y)$ states that none of the members of the list L_2 can unify with Y. The XARG can thus be mapped to either the VAL list or GAP list, enabling overt realization of one or more non-subject complements to co-occur with either local instantiation of the XARG (e.g. [XARG NP_i, VAL $\langle \text{NP}_i, \text{NP}_j \rangle$, GAP $\langle\rangle$]) or non-local instantiation (e.g. [XARG NP_i, VAL $\langle \text{NP}_j \rangle$, GAP $\langle \text{NP}_i \rangle$]), in *pred-hd-comp-cxt*.

We now turn to the problem of modeling the interaction between extraction and Null Instantiation. Our grammar predicts the acceptability of (28) without further stipulation. Signs that are of the sort *ni-index* are not allowed in DTRS because of the constraint in (10), but they are allowed in GAP. This predicts that the object of *please* in (28a) can be typed *ni-index* and appear in GAP. The sign is percolated in the sentence structure like any other extracted sign, and is instantiated with the subject of the adjective *hard*. The subject X of the adjective is then raised like any other subject all the way to the auxiliary verb *don't*. At this point, X is instantiated with the first member of ARG-ST. And because X is typed *dni-index*, it is consistent with what the Imperative Construction requires of the first member of ARG-ST of a verb with imperative mood. The same analysis applies to (28b).

Conversely, note that the present account predicts that examples like (31) are not licit. NI signs are banned from DTRS, and thus there is no way to discharge the sign in GAP and saturate the root sign.

(31) a. $*\emptyset_i$ do you think is easy to talk to $\_\_i$?
b. $*\emptyset_i$ I don't think I've met $_i$.

Finally, the existence of passivized NI arguments as in (32) is likewise predicted without stipulations. Here, the prepositional object is co-indexed with the passive subject of *fed*. The lexical rule for passivization promotes the direct object to subject, and so the first member of ARG-ST of the passive form *fed* is the *ni-index* theme.

(32) If $\emptyset$ properly fed, Iguanas can live for a long time.

We propose to model both long and short passives with the lexical rule in (33). If the PP is resolved as an overt sign we obtain a long passive. If the PP is resolved as a covert sign we obtain a short passive.[12]

[12]Recall that covert signs are allowed in VAL in our ARP, but they cannot be discharged because only *overt-sign*s can appear in DTRS.

(33) **Passive Construction** (↑*inflectional-cxt*) [revised]
passive-cxt →

$$\left[\begin{array}{l}
\text{MTR} \left[\begin{array}{ll}
\text{PHON} & f_{pass}(L_3) \\
\text{SYN} & \left[\text{CAT}\left[\text{VFORM} \quad pass\right]\right] \\
\text{SEM} & Z!\left[\text{FRAMES}\left\langle\left[\text{ARGS}\ \langle W\rangle \oplus L_2\right]\right\rangle\right] \\
\text{ARG-ST} & \langle Y\rangle \oplus L_1 \oplus \left\langle \text{PP}\left[\begin{array}{l}\text{MRKG}\ by \\ \text{SEM}\ \left[\text{INDEX}\ W\!:\!\left[\begin{array}{ll} functional\text{-}index \\ \text{VAR} \quad x\end{array}\right]\right]\end{array}\right]\right\rangle
\end{array}\right] \\
\text{DTRS}\left\langle\left[\begin{array}{ll}
\text{PHON} & L_3 \\
\text{SEM} & Z\!:\!\left[\text{FRAMES}\left\langle\left[\text{ARGS}\ \langle X\rangle \oplus L_2\right]\right\rangle\right] \\
\text{ARG-ST} & \left\langle\left[\begin{array}{l} overt\text{-}sign \\ \text{SEM}\ \left[\text{INDEX}\ X\!:\!\left[\begin{array}{ll} ref\text{-}index \\ \text{VAR} \quad x\end{array}\right]\right]\end{array}\right]\right\rangle \oplus \langle Y\rangle \oplus L_1
\end{array}\right]\right\rangle
\end{array}\right]$$

The subject and XARG of the passive form of a transitive verb will be Y, as a consequence of the constraint in (2) above, which states that the first member of ARG-ST is structure-shared with XARG. The actor frame variable x is now linked to the PP argument. Finally, the ARP in (8) above is responsible for resolving the values of VAL and GAP, given the content of ARG-ST.

2.4 Semantics of NI

We now turn to the matter of interpreting referents that undergo null instantiation. One possibility is to postulate closure rules that add quantifiers to any *ni-index* variable, but we believe that this would make the wrong predictions. Adding such covert quantifiers would predict that NI arguments can participate in scope ambiguity, but as the example in (34) suggests, they cannot. The INI referent must exercise narrow scope in the presence of other scopal operators, such as negation and modals.

(34) a. I can't read.
[Impossible reading: there is a particular text which the speaker cannot read]

b. I should not have contributed.
[Impossible reading: there is a particular amount that the speaker should not have contributed]

In other words, the DNI argument is existentially interpreted *in situ*, as

if there were no quantifier. Thus, when the DNI argument obtains a narrow scope under some other operator, cross-sentential anaphora is not possible:

(35) a. I can't read. #It is in Mixtec.
(cf. I can't read this text. It is in Mixtec)
b. I can't read. It's too dark.
c. I shouldn't have contributed. #I should have given more/less.
(cf. I shouldn't have contributed $100. I should have given more.)

The minimal pair in (36) illustrates how the INI obtains narrow scope and suppresses the possibility of anaphora:

(36) a. Every contestant had to eat a burger. It had roaches on it.
b. Every contestant had to eat. #It had roaches on it.

But if there are no scopal operators, the INI referent is accessible to anaphora:

(37) a. He claims he contributed to the Disaster Relief Fund. If that's true, I don't believe it could have been very much.
b. [The] young lady reminded us they close at 4 so we ate quickly and it was good but a little overpriced.
[TripAdvisor]
c. So I ate, and it was as sweet as honey in my mouth.
[Ezekiel 3:3, *New International Version*]
d. Thirteen said, "you gotta give people food, you know? I mean, to be peaceable". Behind him, Smokey, plate just under her chin, ate eagerly. It had meat in it too.
[*Dhalgren*, by Samuel R. Delany]

As it stands, NI arguments are not associated with any quantifier in logical form in our account. Indices typed *ini-index* must be somehow interpreted as existential indefinites, and indices typed as dni-index must be interpreted as definites. We assume that such interpretations are enforced model-theoretically. That is, when the semantic representation of a frame is interpreted against a model, the variables that are associated with *ini-index* and *dni-index* are interpreted as if they had a quantifier. Suppose P is a frame with n arguments, with the typical truth-conditional definition:

(38) $[\![P(x_1, ..., x_i)]\!] = 1$ *iff* $\langle I(x_1), ..., I(x_n)\rangle \in F(P)$

To capture the distinction between INI and DNI, we draw from Gundel et al.'s (1993) implicational Givenness hierarchy for NPs, and assume that an entity e that is the value of a DNI variable must be a uniquely identifiable member of the Dom(ain), in the given context, as shown in (39b). A uniquely-identifiable referent is an entity that is in the set of Given entities and that

has core characteristics which are not shared by any other entity that is also Given. This uniquely-identifiable constraint is independently needed to license the use of definite descriptions (Gundel et al., 1993).

(39) a. $I(\textit{ref-index}\ \textsc{var}\ v) = val(v)$
b. $I(\textit{dni-index}\ \textsc{var}\ v) =$ there is an $e \in$ Dom such that Uniquely-Identifiable$(e) \wedge val(v) = e$
c. $I(\textit{ini-index}\ \textsc{var}\ v) =$ there is an $e \in$ Dom such that Type-Identifiable$(e) \wedge val(v) = e$

We thus overload the standard interpretation function I such that the variables of referential indices are associated with their respective values from the Domain as usual, as in (39a), but the variables of NI indices implicitly introduce a quantifier as in (39b,c). Thus, for NI variables, their value is some entity from the Domain.[13]

In this analysis *dni-index* referents have uniquely identifying properties in the given context, just like those referents that are characterizable with the definite determiner *the*. Conversely, the entity e in (39c) must be type-identifiable, rather than uniquely identifiable. Thus, *ini-index* referents are not assumed to be known by the addressee, just like those referents that are characterizable with indefinite determiner $a(n)$. As in Gundel et al.'s (1993) account of definite and indefinite determiners, the interpretation of DNI and INI variables depends on their cognitive status, not logical form. Once an NI variable is assigned a value by the *val(uation)* function, it becomes indistinguishable from referential and overtly quantified variables, and can be anaphorically bound like any other, as in (37), because they are in the domain of *val*. The construal of implicit arguments as prototypical participants, their failure to behave like regular quantified arguments, and their limited ability to serve as antecedents follows from their status (Mauner & Koenig, 2000).

3 Conclusion

In this work we propose that implicit arguments are not inaudible pieces of syntax but instead arise from a mismatch between a predicator's arguments (as in its ARG-ST and FRAMES list) and its valence (as in its VAL list). NI arguments are signs but not syntactic daughters. Our account encompasses two kinds of unrealized arguments that have not generally been treated as NI: Imperative 'subjects' and null subjects of infinitival (base form and gerundial) verbs, re-envisioning the Imperative rule as a derivational (lexeme-lexeme) construction rather than a phrasal rule (as in the S over VP treatment in Sag et al. 2003). Our treatment does not rely on sign types *gap* or *pro*, which Sag

[13] Constraints such as those imposed in (39b) may be presuppositional in nature, and if so, we could assume they are embedded under Beaver's (1992) ∂-operator, following the analysis of definite descriptions in Coppock & Beaver (2015).

(2012) lists in the type hierarchy. We specify that the members of VAL and GAP are simply signs. Finally, we amend the Predictional Head-Complement Construction, which in Sag (2012: 152) did not allow subject extraction.

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