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Noun incorporation in Functional Discourse Grammar

Abstract: This chapter discusses the treatment of noun incorporation within the framework of Functional Discourse Grammar in relation to the place of interfaces within this grammatical theory. Interfaces are organized, on the one hand, in terms of implicational typological hierarchies, which constrain the possibilities for noun incorporation to occur in a language, depending on the cut-off points relevant for that language. On the other hand, there are restrictions on incorporation that are not predictable in terms of typological hierarchies, which are captured by basic settings within the interfaces. Starting from this division of labour between hierarchies and settings, we discuss the typology of noun incorporation in terms of the interfaces between pairs of levels within the grammar. Since noun incorporation is a morphosyntactic phenomenon, the Morphosyntactic Level is always involved in these pairs. Thus, the relevant interfaces are the interface between the Interpersonal Level and the Morphosyntactic Level, the one between the Representational Level and the Morphosyntactic Level, and the one between the Morphosyntactic Level and the Phonological Level. After this pairwise typological discussion of constraints on noun-incorporation, we present one worked example of a full set of constraints within a single language, Kalaallisut.

Keywords: Noun incorporation, Functional Discourse Grammar, typological hierarchies, interfaces

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1 Introduction

Noun incorporation concerns the situation in which a nominal unit combines with a verbal unit to form a single verbal word (Gerdtts 1998: 84; Mithun 2000: 916; Aikhenvald 2007: 11; Massam 2017). An initial example from Yucatec Maya is given in (1).

(1) a. *t-in ch'ak-ah che' ichil in kòol*
 PST-1SG.SBJ cut-COMPL tree in 1SG.POSS milpa
 'I chopped trees in my cornfield.'

b. *h ch'ak-che'-nah-en ichil in kòol*
 PST cut-tree-COMPL-1SG.ABS in 1SG.POSS milpa
 'I chopped trees in my cornfield.'

(Bricker, Po'ot Yah, and Dzul de Po'ot 1998: 354, cited in Lehmann and Verhoeven 2005: 150)

Example (1a) shows a regular transitive clause in Yucatec Maya, with a verb with the stem *ch'ak* 'cut' and an object noun *che'* 'tree'. In example (1b), the noun *che'* is incorporated into the verb: the noun here follows the verbal stem *ch'ak* but precedes the verbal inflectional suffixes.

Noun incorporation constructions show highly varied properties cross-linguistically. For instance, languages differ in whether their incorporated nouns can be used to refer (Massam 2009: 1084; Murasugi 2014: 284–285; Borik and Gehrke 2015: 6), and whether incorporation functions to background the participant designated by the incorporated noun (Mithun 1984: 859; Gerdtts 1998: 86). In addition, whereas some languages restrict noun incorporation to arguments, others also show incorporated modifiers (Mithun 1984: 875; Gerdtts 1998: 87; Murasugi 2014: 284). Besides, in many but not all incorporating languages there are, for most noun incorporation constructions, corresponding constructions in which the noun and verb appear as separate words (Mithun 1984: 847–848; Gerdtts 1998: 84–85; Massam 2017), as exemplified for Yucatec Maya in (1). Furthermore, incorporated nouns may be phonologically identical to non-incorporated nouns in the same language or may have specialized forms (Mithun 1984: 876; Caballero et al. 2008: 387–388).

Because the various pragmatic, semantic, morphosyntactic and (morpho)phonological properties associated with incorporated nouns appear to be combined in different ways in different languages, noun incorporation is particularly interesting for discussions about interfaces in grammatical theory. An interface can be defined as a set of rules that state the possible relations between

different types of grammatical representations. Functional Discourse Grammar (FDG) has four such representations, i.e. the Interpersonal Level (IL), Representational Level (RL), Morphosyntactic Level (ML) and Phonological Level (PL), which contain pragmatic, semantic, morphosyntactic and phonological representations respectively. As all these levels play a role in the way the phenomenon of noun incorporation manifests itself cross-linguistically, FDG provides a suitable framework to study interface conditions in noun incorporation (see Section 2).

In this paper, we provide an FDG analysis of the interface conditions involved in noun incorporation. Following Hengeveld and Mackenzie (this volume), we consider that differences between interface conditions across languages are preferably defined, whenever possible, in terms of typological hierarchies or constraints, such that for every language the cut-off point that it displays on the many hierarchies involved will predict the working of the interfaces. Based on earlier literature and data from a large number of incorporating languages, this paper proposes a set of hierarchies that determine the constraints on the possible mappings between the FDG levels in noun incorporation in different languages. In addition to these hierarchies, a number of basic settings concerning noun incorporation is provided. These state, for instance, whether a language allows incorporation at all and which alignment system is applied in incorporation. The distinction between hierarchies and basic settings may at first sight seem similar to the one between principles and parameters in the generative tradition (see e.g. Chomsky and Lasnik 1993). There is a major difference, however, as in the Principles and Parameters approach in Generative Grammar, principles are assumed to be common to all languages, whereas in FDG the typological hierarchies constrain variation between languages, as it does not assume all languages to be fundamentally the same.

We first introduce the FDG framework and its approach to interfaces in Section 2. Our FDG definition of noun incorporation follows in Section 3. Subsequently, we look at the relevant interfaces between pairs of levels, where the pairs are presented in a top-down manner, starting from the highest level. As incorporation is a morphosyntactic phenomenon, ML is always involved in these pairs. Thus, the relevant interfaces are the IL-ML interface, discussed in Section 4, the RL-ML interface, addressed in Section 5, and the ML-PL interface, examined in Section 6. We provide examples concerning the relevant pairs in each of these sections, but in Section 7 we exemplify these in one particular language, Kalaallisut, showing how the interfaces between the three different pairs of levels together capture its possibilities for noun incorporation. Here we also exemplify how the pragmatic, semantic, morphosyntactic, and phonological properties of incorporated nouns may or may not match across the

different levels in FDG. In Section 8, we then discuss our findings and draw our conclusions.

2 Functional Discourse Grammar

Functional Discourse Grammar (Hengeveld and Mackenzie 2008) is a typologically-based theory of language structure with the four-level architecture shown in Figure 1. The figure shows that FDG is the Grammatical Component of a wider theory of verbal interaction, in which it interacts with a Conceptual, Contextual, and Output Component. Figure 1 also shows that FDG has a top-down organization, working down from larger to smaller units.

Within the Grammatical Component itself, there are four levels of analysis. Two of these, the Interpersonal Level and the Representational Level, are the output of the operation of Formulation. This operation converts conceptual representations into pragmatic and semantic representations. The Morphosyntactic Level and the Phonological Level are the output of the operation of Encoding, which translates pragmatic and semantic representations into morphosyntactic and phonological ones.

Internally, every level is hierarchically organized in terms of layers relevant to that level. For instance, at the (actional) Interpersonal Level, layers such as the Discourse Act and the Referential Subact are relevant; at the (designational) Representational Level, layers such as the Propositional Content and the State-of-Affairs are needed; at the Morphosyntactic Level layers such as the Noun Phrase and the Clause are used; finally, at the Phonological Level prosodic units such as the Intonation Phrase and the Phonological Word are relevant.

Layers may be further modified by modifiers, operators and functions. Modifiers differ from operators and functions in being lexical rather than grammatical. The difference between operators and functions is that the latter are relational while the former are not. Examples of operators that will show up in Section 4.4 are identifiability and specificity operators that operate on Referential Subacts at the Interpersonal Level. Examples of modifiers are adjectives that modify Individuals and locative phrases that modify States-of-Affairs, both at the Representational Level. Finally, examples of functions are the Actor and Undergoer functions of arguments at the Representational Level and the Subject function of Noun Phrases at the Morphosyntactic Level.

In the next section, we will consider how noun incorporation fits into this general architecture.

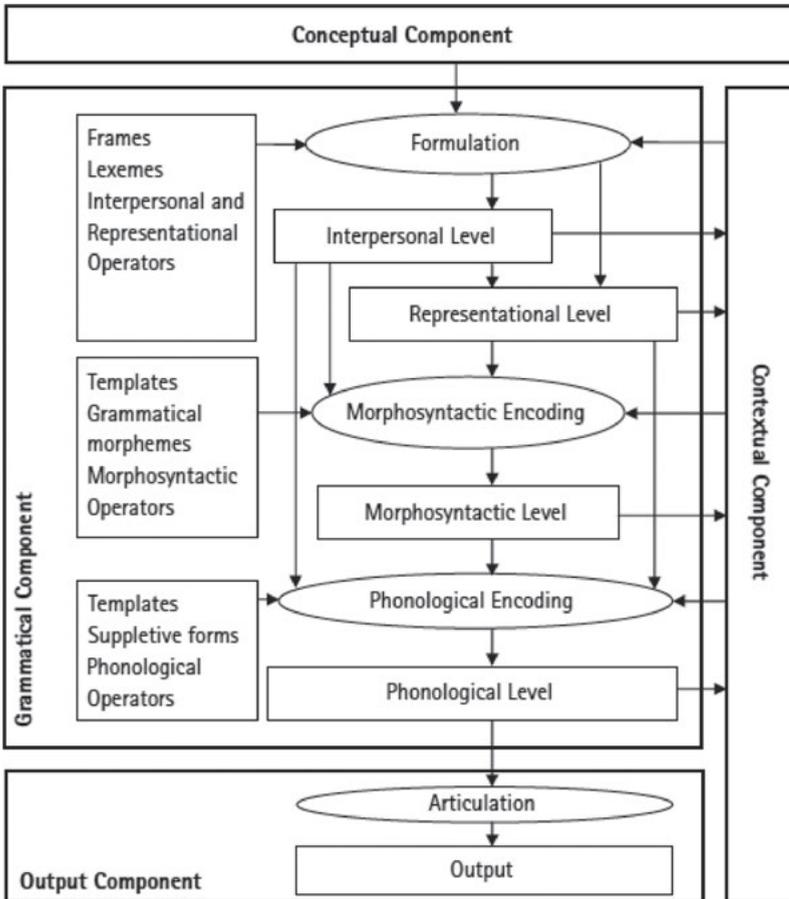


Figure 1: General architecture of Functional Discourse Grammar (Hengeveld and Mackenzie 2008: 13).

3 Defining noun incorporation in FDG

Before moving to the actual interfaces involved in noun incorporation, it is important to indicate how we define noun incorporation in FDG. Various definitions of noun incorporation have been proposed in the literature, differing chiefly in whether they characterize noun incorporation as a lexical or syntactic process (Massam 2009: 1077; Murasugi 2014: 284; Haugen 2015: 414; Johns 2017). In this study, we restrict the term noun incorporation to productive, semantically transparent processes in which a nominal and a verbal unit at RL together form a

single verbal Word at ML. Thus, we consider noun incorporation a phenomenon that takes place at the grammatical levels rather than in the Lexicon. More specifically, we define noun incorporation constructions as cases in which a nominal and a verbal unit that are in a dependency relation of the form head-modifier or predicate-argument at RL, form a single verbal Morphosyntactic Word.

Note that this definition entails that noun incorporation shows a certain degree of overlap with compounding.¹ In FDG, a distinction can be made between compounds formed by combining lexical primitives in the Lexicon and semantically transparent compounds that are productively created in the Grammatical Component (Hengeveld and Mackenzie 2016: 1150–1153). The latter type can be further divided into head-modifier, predicate-argument and conjunct-conjunct compounds. Head-modifier and predicate-argument compounds consisting of a nominal and a verbal unit that are morphosyntactically verbal equal noun incorporation as we define it here.

Noun incorporation can also be linked to the notion of polysynthesis. In the literature on noun incorporation, the phenomenon has sometimes even been considered a necessary feature of polysynthetic languages (Genee 2018: 243). Within the FDG framework, Genee (2018: 264) has identified five parameters that contribute to a language's degree of polysynthesis and noun incorporation may play a role in each of them. Most importantly, noun incorporation leads to higher lexical density, because incorporation of a noun into a verb always results in a Morphosyntactic Word with at least two lexical Morphemes.

According to our definition, noun incorporation takes place at ML. This level distinguishes the morphosyntactic layers presented in (2).

(2) *Morphosyntactic layers in FDG*

Le_n = Linguistic Expression

Cl_n = Clause

Xp_n = Phrase (of type x)

Xw_n = Word (of type x)

Xm_n = Morpheme

Morphemes are further divided into three types: Stems (Xs_n), Roots (Xr_n) and Affixes (Aff_n). Note that the difference between a Stem and a Root in FDG is that

¹ Correspondingly, the hierarchies proposed in this paper for the interface conditions on noun incorporation may also be relevant for other grammatical head-modifier and predicate-argument compounds.

a Root cannot occur independently, i.e. without being attached to another lexical Morpheme, while a Stem can (Hengeveld and Mackenzie 2008: 404).

All morphosyntactic layers in (2), except for Le_n , which represents the maximal morphosyntactic unit, may be embedded into other units, leading potentially to full recursivity. This means that Morphosyntactic Words too may embed other morphosyntactic units, with incorporation as the result. Many different configurations are possible within the template of a Morphosyntactic Word. In (3), we illustrate the possibilities for noun incorporation. For reasons of space, we limit ourselves here to configurations in which the nominal unit precedes the verbal one, even though the reverse can also be found (Caballero et al. 2008), and in which the verbal unit is a Stem (Vs_1), although verbal Roots may incorporate nouns as well.²

- (3) a. (Vw_1 : [(Aff_n) (Nr_1) (Vs_1) (Aff_n)] (Vw_1))
 b. (Vw_1 : [(Aff_n) (Ns_1) (Vs_1) (Aff_n)] (Vw_1))
 c. (Vw_1 : [(Aff_n) (Nw_1) (Vs_1) (Aff_n)] (Vw_1))
 d. (Vw_1 : [(Aff_n) (Np_1) (Vs_1) (Aff_n)] (Vw_1))

The different possible configurations also illustrate the morphosyntactic characteristics that we use to verify that apparent noun incorporation constructions are single Morphosyntactic Words. This is important because our definition of noun incorporation depends on Morphosyntactic Word status. In most cases, the position of a nominal unit between a verbal Affix and a verbal Root or Stem shows that it is incorporated into the verbal Word. In a few languages that do not tend to use Affixes, verbal clitics and particles can be considered in the same way as verbal Affixes. Finally, in some languages the Root status of either the nominal or the verbal unit can be used to recognize incorporation: as Roots necessarily combine with another lexical Morpheme in a Morphosyntactic Word, the occurrence of a nominal Root next to a verbal lexical Morpheme or the occurrence of a verbal Root next to a nominal lexical Morpheme shows that the two form a single Morphosyntactic Word.

Another important aspect of noun incorporation shown in the configurations in (3) is that the incorporated unit may be a nominal Root (Nr_1), as in (3a), a nominal Stem (Ns_1), as in (3b), a nominal Word (Nw_1), as in (3c), or a Noun Phrase (Np_1), as in (3d). A terminological comment is in order now: what is generally called ‘noun incorporation’ is not always ‘noun stem incorporation’ but may also be ‘nominal root incorporation’, ‘nominal word incorporation’ or ‘noun phrase

² We also include constructions with bound verbal units that are sometimes called derivational affixes as noun incorporation constructions, as long as these verbal units form a large group in the relevant language and have concrete, verb-like meanings. These considerations concern languages like Eastern Canadian Inuktitut, Kalaallisut and Nuu-chah-nulth.

incorporation'. In order to avoid unnecessary terminological complexities, we use the term 'noun incorporation' for all four situations.³

The possibilities represented in (3) do not appear in languages randomly. Olthof (2020a) investigates the range of morphosyntactic units that may be incorporated cross-linguistically. Based on her results for noun incorporation specifically, the implicational hierarchy given in (4), in which the class of lexical Morphemes includes both Roots and Stems, may be proposed to describe the possibilities for incorporated nouns.

(4) lexical Morpheme \supset derived Stem \supset inflected Word \supset Phrase

This hierarchy expresses that the most common form of noun incorporation concerns the incorporation of lexical Morphemes, followed by grammatically derived Stems, inflected Words and Phrases. Also, the hierarchy states that if, in a particular language, a noun of a category more to the right in the hierarchy can be incorporated, then nouns of all categories to the left can be incorporated as well. Data from 30 languages presented in Olthof (2020a) largely confirm the hierarchy in (4).⁴ It thus seems that languages can be parametrized, in that for every language a particular cut-off point in (4) can be specified at ML. Note that this is not an interface condition, but a restriction that applies in the Morphosyntactic Encoder itself.

Interfaces between ML on the one hand and IL, RL and PL on the other hand are, however, highly relevant for noun incorporation. In noun incorporation constructions, the nominal unit at ML may map onto various units at IL, RL and PL, as will be discussed in the next sections. Some of these mappings create mismatches between levels. Most importantly, noun incorporation constructions typically involve two separate units at RL that form a single unit at ML. Usually it is one of the two arguments of a transitive verb that is incorporated into this verb (see also Section 5.4). This means that two units from a single Configurational Property at RL form a unit at ML, while the other argument that plays a role in the same Configurational Property is expressed as a separate unit at ML. In this way, noun incorporation entails a mismatch between RL and ML, i.e. in Encoding (see Section 7 for an illustration).

³ The different types of incorporated units contribute in different degrees to the polysynthetic character of a language, as the inclusion of higher morphosyntactic layers within one Word may be assumed to make a language more polysynthetic than the inclusion of lower morphosyntactic layers within one Word (Genee 2018: 264).

⁴ Only one of the 30 languages does not conform to this hierarchy of the forms of incorporated nouns: in Yimas, incorporated nominal Stems and incorporated nominal Words occur, while no examples of incorporated nominal derived Stems are found in the study. Note, however, that the incorporation of adverbial derived Stems is attested.

4 The IL-ML interface

4.1 Introduction

There are several aspects of IL that (co-)determine whether noun incorporation is or is not allowed in a language. The relevant aspects are the following:

- (i) The interpersonal category of the incorporated noun: is it a Referential Subact or not?
- (ii) The head of the incorporated noun: is it a proper name or a common noun?
- (iii) The pragmatic operators applying to the incorporated noun: what are its identifiability (+id/–id) and specificity (+s/–s) values?
- (iv) The pragmatic function of the incorporated noun: does it have a Focus function, a Background function, or neither of them?

We will address these aspects one by one in what follows.

4.2 The interpersonal category of the incorporated noun

Languages may show non-referential incorporated nouns only, limit incorporation to referential nouns, or allow both referential and non-referential incorporated nouns. In Paraguayan Guaraní, incorporation is restricted to non-referential nouns. Example (5) shows that it is not possible in this language to refer anaphorically to an incorporated noun.

- (5) **A-hova-hei-se* *pe-mitã, pero i-sy* *he'i*
 1.ACSBJ-face-wash-DES that-child but 3.INACSBJ-mother say
nda-i-ky'a-i *ha.*
 NEG-3.INACSBJ-dirty-NEG that
 'I wanted to wash the child's face but his mother said that it wasn't dirty.'
 (Velázquez-Castillo 1995: 694; Velázquez Castillo 1996: 144)

Paraguayan Guaraní incorporated nouns do thus not correspond to Referential Subacts at IL. Instead, they are part of the Ascriptive Subacts corresponding to the incorporating verbs (see also Smit 2005: 105).⁵

⁵ Alternatively, non-referential incorporated nouns like the ones in Paraguayan Guaraní may correspond to independent Ascriptive Subacts. It does not seem possible to decide which of these possibilities is correct. Ascriptive Subacts can be recognized on the basis of the presence of a modifier or operator of approximation (Hengeveld and Mackenzie 2008: 111–112), but for most of

By contrast, in Panare “incorporation can be used when the incorporated unit refers to a highly referential and specific entity” (Payne 1995: 309). In this language, incorporation has “specific semantic effects which do not include “downplaying” the identity, referentiality or identifiability of an O[bject] argument” (Payne and Payne 2013: 330). Thus, we conclude that incorporated nouns in Panare instantiate Referential Subacts. An example of noun incorporation from Panare is shown in (6).

- (6) *Yu'pétyaka-ñe* *kěj* *kën.*
y-pu-pétyaka-ñe *kěj* *kën*
 3-head-split-NSPEC.TR AN.PROX AN.INVIS
 ‘He’s_i gonna split his_j head.’
 (Payne 1995: 301; Payne and Payne 2013: 332)

In Bininj Kun-Wok, both referential and non-referential incorporated nouns can be found. Example (7) shows the incorporation of the noun *murrng* ‘bone’ into the verb *bimbom* ‘paint’. Here, *murrng* is used referentially, i.e. it corresponds to a Referential Subact, as evidenced by the demonstrative *na-mekke*, which appears as modifier of the incorporated noun external to the incorporation construction. In example (8), on the other hand, the incorporated noun *yaw* ‘baby, child’ is non-referential. It is used as a secondary predicate and correspondingly instantiates an Ascriptive Subact.

- (7) *Nga-murrng-bimbom* *na-mekke.*
 1>3-bone-paint.PST.PFV M-DEM
 ‘I painted those bones.’
 (Evans 2003: 235)

- (8) *Birri-yaw-ni.*
 3.AU-baby/child-sit.PST.IPFV
 ‘They sat down like children.’
 (Evans 2003: 484)

the languages we studied we have not been able to verify whether or not non-referential incorporated nouns can combine with such a modifier or operator. Moreover, the potential unavailability of such modifiers and operators could also be due to morphosyntactic restrictions on what can be incorporated rather than on interpersonal ones. Note that incorporated nouns functioning as nominal predicates are an exception to these considerations, as these always instantiate their own Ascriptive Subacts.

In a study on the referential potential and modification possibilities of incorporated nouns in a sample of 21 incorporating languages, Olthof (2020b) finds that two languages restrict incorporation to referential nouns, in 8 languages only non-referential nouns occur, and eleven languages show both referential and non-referential incorporated nouns. Based on these data, there does therefore not seem to be an implicational relationship between the incorporation of nouns used referentially and those used non-referentially. All possible combinations occur. We can thus formulate a basic setting regarding the pragmatic category of incorporated nouns, where languages belong to one of the three following types:

- (9) *Incorporation of referential nouns / Incorporation of non-referential nouns / Incorporation of both referential and non-referential nouns*

4.3 The head of the incorporated noun

In addition to this basic setting, a number of hierarchies concerning the pragmatic characteristics of incorporated nouns seem to emerge from the data. The first of these has to do with the question whether the incorporated noun is a common noun or a proper name. The incorporation of proper names is cross-linguistically rare (Mithun 1984: 864; Borik and Gehrke 2015: 5) and has even been proposed to be impossible (Mardirussian 1975: 386). It appears that the few languages that do allow the incorporation of proper names, such as Eastern Canadian Inuktitut (Johns 2009: 190–191), Kalaallisut (Sadock 1980: 314; see example (77)), Nivkh (Mattissen 2017: 861) and Ute-Southern Paiute (Givón 2013: 322–323), additionally show the incorporation of common nouns. Thus, in Eastern Canadian Inuktitut, we find both construction (10), with the incorporated common noun *savi* ‘knife’, and construction (11), with the incorporated proper name *Miali*.

- (10) *savi-siuq-tunga.*
 knife-look.for-1SG.PART
 ‘I am looking for a knife.’
 (Johns 2009: 187)
- (11) *Qallupilluq Miali-tu-niaq-pa?*
 Qallupilluq Mary-consume-NEARFUT-3SG.INTERR
 ‘Is Qallupilluq (a sea monster) going to eat Mary?’
 (Johns 2009: 191)

Most other languages, however, limit incorporation to common nouns. For instance, in Mapudungun (Loncon Antileo 2017: 46), Nadëb (Weir 1990: 325), Nuu-chah-nulth (Stonham 2008: 524) and Southern Tiwa (Allen, Gardiner, and Frantz 1984: 301), common nouns may be incorporated, whereas proper names may not. A possible explanation for the rare occurrence of incorporated proper names could be that languages generally only allow the incorporation of lexemes inserted at RL, while proper names differ from other nouns in appearing at IL (Hengeveld and Mackenzie 2008: 19). In addition, proper names are special in that they are only used for referents that are assumed to be identifiable for the addressee (Hengeveld and Mackenzie 2008: 117). Many languages limit incorporation to non-referential nouns, as discussed in the previous subsection, or to nouns with referents that are not identifiable for the addressee, as will be discussed in the next subsection.

The hierarchy in (12) captures the data concerning the heads of incorporated nouns observed so far.

(12) *Incorporation of common nouns* \supset *Incorporation of proper names*

Since proper names are intrinsically referential, the fact that a language allows the incorporation of proper names automatically implies that it allows the incorporation of Referential Subacts, not only those expressed by proper names but also those expressed by other types of referential nouns.

4.4 The pragmatic operators applying to the incorporated noun

With respect to pragmatic operators, we consider here the restrictions on noun incorporation that have to do with the identifiability of the referent for the addressee and the identifiability of the referent for the speaker. In languages with referential incorporated nouns, speakers may or may not assume these referential nouns to be identifiable for the addressee. In several languages, such as Chimalapa Zoque (Johnson 2000: 274) and Nuu-chah-nulth (Waldie 2004: 52), the referents evoked by referential incorporated nouns are necessarily non-identifiable for the addressee. Other languages, including Kalaallisut (Sadock 1985: 399), Mapudungun (Baker, Aranovich, and Golluscio 2005: 174), Mohawk (Baker 1996: 288), Nivkh (Mattissen 2003: 175–176) and Sora (Anderson 2017: 941, fn. 12), do show incorporated nouns with referents that are taken to be identifiable for the addressee. This is often evidenced by the possibility to combine them with demonstratives, as in example (7) above. However, these languages allow the incorporation of nouns with referents that are not identifiable for the addressee as well. In example (13) from Mohawk, for instance, the noun *ather* ‘basket’ is assumed not to be identifiable for the addressee

in the first incorporation construction, but in the second incorporation construction it is identifiable for the addressee (Baker 1996: 288).

- (13) *Thetáre* *áska* *w-ather-a-yá-tah-kwe'* *nek tsi* *Wishe*
 yesterday one N.SG.SBJ-basket-Ø-lie-HAB-PST but PRT Michael
í-k-ehr-e' *wa-ha-[a]ther-a-hnúnu-'*.
 Ø-1SG.SBJ-think-IPFV FAC-M.SG.SBJ-basket-Ø-buy-PNCT
 'There was a basket (here) yesterday, but I think Michael (basket-)bought it.'
 (Baker 1996: 288)

From facts like these, we tentatively derive the following implication:

- (14) *Incorporation of –id nouns* \supset *Incorporation of +id nouns*

Languages may also restrict the incorporation of referential nouns to those with referents that are not identifiable for the speaker, i.e. that are non-specific. Thus, Chimalapa Zoque (Johnson 2000: 274) and Nuu-chah-nulth (Nakayama 2014: 455) do not show the incorporation of nouns that evoke specific referents. By contrast, Kalaallisut (Fortescue 1984: 251, 300), Mohawk (Baker 1988: 79, 1996: 288), Southern Tiwa (Allen, Gardiner, and Frantz 1984: 297) and Washo (Lemieux 2010: 154; Bochnak and Rhomieux 2013: 271) do allow the incorporation of nouns with specific reference. These languages additionally show incorporated nouns with referents that are not identifiable for the speaker. For instance, the incorporated noun *qimmi* 'dog' in the Kalaallisut example in (15) has a non-specific incorporation, while the Kalaallisut noun *piili* 'car' in example (16) has a specific interpretation.

- (15) *qimmi-qar-puq*
 dog-have-3SG.IND
 'He has a dog/dogs/there are dogs.'
 (Fortescue 1984: 300)
- (16) (*sukka-suu-mik*) *piili-si-vuq*
 (be.fast-INTR.PTCP-INS.SG) car-buy-3SG.IND
 'He bought a (fast) car.'
 (Fortescue 1984: 251)

Based on these facts we preliminarily propose the implication in (17).

- (17) *Incorporation of –s nouns* \supset *Incorporation of +s nouns*

4.5 The pragmatic function of the incorporated noun

Finally, the possible pragmatic functions of incorporated nouns play a role in the IL-ML interface. It has been noted that in many languages, noun incorporation is a backgrounding device (Mithun 1984: 874; Gerdtts 1998: 86; Massam 2017). Thus, nouns may be incorporated in order to mark them as having a Background function. Focal nouns, by contrast, are generally not found in incorporation constructions (Baker 1988: 78–79; Gronemeyer 1996: 29; Aikhenvald and Green 1998: 453; Lehmann and Verhoeven 2005: 117; DeClaire, Johns, and Kučerová 2017: 5, 7).

Mohawk is an example of a language in which incorporated nouns may have a background function but not a focus function (Mithun 1984: 869; Baker 1996: 290; DeClaire, Johns, and Kučerová 2017: 5–7). More precisely, in this language noun incorporation is obligatory unless either the noun or the verb has a focus function. Thus, example (18b), in which the incorporated noun *honwa* ‘boat’ has a background function, is grammatical, while example (19b) is not accepted. Here the incorporated noun *sereht* ‘car’ has a focus function.

- (18) a. *Ónhka wa'ehonwahní:non'*
onhka wa'-e-honw-a-hninon-'
 who FAC-F.SG-boat-LK-buy-PNCT
 ‘Who bought a boat?’
- b. *Wá:ri wa'ehonwahní:non'*
Wari wa'-e-honw-a-hninon-'
 Mary FAC-F.SG-boat-LK-buy-PNCT
 ‘MARY bought a boat.’
 (DeClaire, Johns, and Kučerová 2017: 4)
- (19) a. *Wahahonwahní:non' ken ne Sewátis?*
wa-ha-honw-a-hninon- ken ne Sewatis
 FAC-M.SG-boat-LK-buy-PNCT Q PRT John
 ‘Did John buy a boat?’
- b. *#Iah. Waha'serehtahní:non'*
iah wa-ha-'sereht-a-hninon-'
 no FAC-M.SG-car-LK-buy-PNCT
 ‘No. He bought a car.’
 (DeClaire, Johns, and Kučerová 2017: 4)

Similarly, in Ket “incorporation [tends] to be used to background an item in discourse”, while a construction without incorporation is “used to topicalize the

same item” or “expresses instead a focused, unexpected, or otherwise individuated verb-external object” (Vajda 2017: 910–911).

However, there are also languages in which both backgrounded and focal nouns can be incorporated. In the Kalaallisut example (20a), *kaage* ‘cake’ is part of the focal part of the message. In (20b) it is picked up again and therefore now part of the background. In (21), the incorporated noun *aput* ‘snow’ refers to the new topic introduced in this sentence and is therefore focal in nature, just like *kaage* in (20a).

- (20) a. *Ipassaq kaage-liur-pugut.*
 yesterday cake-make-1PL.IND
 ‘Yesterday, we made cake.’
- b. *Ullumi kaage-rniar-pugut.*
 today cake-sell-1PL.IND
 ‘Today, we are selling cake.’
 (van Geenhoven 1998: 37)
- (21) (Piuutsuq was unable to continue)
Nuna-Ø aput-qar-lir-riir-puq.
 land-ABS.SG snow-have-INGR-already-3SG.IND
 ‘Snow was on the land already.’
 (Bittner 2007, cited in Smit 2010: 247–248)

Given that we have not encountered languages in which focal nouns can be incorporated while backgrounded ones cannot, we speculate that the hierarchy in (22) correctly describes the distribution of incorporated nouns with Background and Focus function.

- (22) *Incorporation of nouns with Background function* \supset *Incorporation of nouns with Focus function*

Based on the findings for noun incorporation and Background and Focus function, it could also be expected that other dimensions of information structure, such as the one dividing a discourse act into Topic versus Comment and the one distinguishing Overlap and Contrast, are subject to similar hierarchies, as suggested in (23) and (24):

- (23) *Incorporation of nouns with Topic function* \supset *Incorporation of nouns with Comment function*

(24) *Incorporation of nouns with Overlap function* \supset *Incorporation of nouns with Contrast function*

However, data concerning pragmatic functions of incorporated nouns are very limited and the definitions of topic and contrast used in different studies vary greatly. For this reason, these expectations could not be tested.

5 The RL-ML interface

5.1 Introduction

At RL, too, there are many factors that (co-)determine whether or not noun incorporation is allowed in a language. These include the following:

- (i) The semantic layer of the incorporated noun: does the noun designate a Property or an Entity?
- (ii) The semantic function of the incorporated noun: is it an Undergoer, an Actor or something else?
- (iii) The type of dependent element with respect to the incorporating verb: is the incorporated noun an intransitive argument, transitive argument or a modifier?
- (iv) Alignment system: for verbs with more than one argument, which argument may be incorporated?
- (v) Relationality: is the incorporated noun relational or non-relational?

5.2 The semantic layer of the incorporated noun

Incorporated nouns may either be Property-denoting nouns, i.e. nouns at the RL layer of the Property, here called f-nouns, or Entity-designating nouns, such as nouns at the RL layer of the Individual or other RL layers, here indicated as α -nouns (Smit 2005: 102–103). These types of incorporated nouns can be differentiated based on their modification possibilities: f-nouns are non-modifiable, while α -nouns can be modified.⁶ Languages differ in which of these types of nouns they show in incorporation constructions: they may limit incorporation to

⁶ It is possible for f-nouns to combine with Property modifiers (Hengeveld and Mackenzie 2008: 230–231). However, because this type of modification is highly marginal, we consider f-nouns as non-modifiable here.

f-nouns, only allow α -nouns as incorporated nouns, or show both incorporated f-nouns and incorporated α -nouns.

In Western Frisian all incorporated nouns are f-nouns. The examples in (25) show that it is not possible to modify an incorporated noun in this language by means of plural inflection (25a), determiners (25b), adjectives (25c) or adpositional phrases (25d).⁷

- (25) a. *Heit jerappel/*jerappel-s dolt de hiele dei*
 father potato/potato-PL digs DEF whole day
 ‘Our father is digging potatoes all day long.’
- b. *De buorlju sieten bûten te *de/*dy/*sokke wyn-driken*
 DEF neighbours sat outdoors to DEF /DEM /such wine-drink
 ‘The neighbours sat outdoors to drink the/that/such wine.’
- c. **Heit sit te grouwe jerappel-skilen*
 father sits to huge potato-peel
 ‘Father is sitting, peeling huge potatoes.’
- d. **Heit sit te jerappel mei in soad spruten skilen*
 father sits to potato with INDF lot sprouts peel
 ‘Father is sitting, peeling potatoes with a lot of sprouts.’
 (Dijk 1997: 15–16)

In contrast to the Western Frisian incorporated nouns, incorporated nouns in Niuean are always α -nouns. In this language three types of noun incorporation can be recognized, which are called “general”, “existential” and “instrumental” (Seiter 1980, cited in Massam 2001: 167). Incorporated nouns in each of these types are α -nouns, as they may be modified by relative clauses and/or constitute the head of full noun phrases (Massam 2001: 169, fn. 18, 175, 178). An example of a Niuean incorporated noun modified by a relative clause is shown in (26).⁸

- (26) *Ne fai fale a Sione ne tā e au.*
 PST have house ABS Sione PST build ABS I
 ‘Sione has a house that I built.’
 (Massam 2001: 175)

⁷ In Western Frisian, the morphosyntactic word status of noun incorporation constructions can be identified on the basis of the verbal infinitive marker *te*, which usually directly precedes the verbal word but precedes the noun in a noun incorporation construction, as in (25b–d).

⁸ In Niuean, verbal enclitics follow incorporated nouns (Seiter 1980: 69), thus showing that the incorporated noun and the incorporating verb form a single morphosyntactic word.

Finally, in Bininj Kun-Wok both incorporated f-nouns and incorporated α -nouns are found. Incorporated body-part nouns and incorporated generic nouns, which function semantically as arguments of incorporating verbs, may be modified by adjectives, possessive pronouns, demonstratives, numerals and relative clauses (Evans 2003: 452), as exemplified in (7) above. By contrast, incorporated nouns functioning as secondary predicates, shown in (8), are not modifiable (Evans p.c.) and can thus be considered f-nouns. These examples are repeated here for convenience.

(7) *Nga-murrng-bimbom na-mekke.*

1>3-bone-paint.PST.PFV M-DEM

'I painted those bones.'

(Evans 2003: 235)

(8) *Birri-yaw-ni.*

3.AU-baby/child-sit.PST.IPFV

'They sat down like children.'

(Evans 2003: 484)

These facts from Western Frisian, Niuean and Bininj Kun-Wok illustrate that an implicational relationship cannot be established between the incorporation possibilities of the two semantic types of nouns (see also Olthof 2020b). Languages therefore need a basic setting for this parameter, as given in (27).

(27) *Incorporation of f-nouns / Incorporation of α -nouns / Incorporation of both f-nouns and α -nouns*

Within the class of α -nouns, the ones designating Individuals exhibit in many languages a distinction between those designating animate Entities and those designating inanimate Entities. In these languages, inanimate nouns may be the only type of nouns that can be incorporated (Mithun 1984: 863; Borik and Gehrke 2015: 5) or may "incorporate more readily than animate nouns" (Gerds 1998: 85; see also Lehmann and Verhoeven 2005: 115; Sadock 2006: 585). This asymmetry between animate and inanimate nouns may be related to the different functions of animate and inanimate nouns in discourse, as animate nouns are typically more central in discourse than inanimate ones, while incorporation often functions to background nouns (Mithun 1984: 863; Gerds 1998: 85–86).

In Southern Tiwa, incorporation is obligatory for inanimate direct objects, inanimate subjects of intransitive verbs, animate non-human direct objects (unless they are singular and co-occur with an external modifier, in which case incorporation is optional) and plural human direct objects (unless they co-occur

with an external modifier, in which case incorporation is optional) (Allen, Gardiner, and Frantz 1984: 293, 295, 296, 299–300). By contrast, human singular direct objects are only optionally incorporated (unless when the subject is third person, in which case the incorporation is obligatory) (Allen, Gardiner, and Frantz 1984: 294) and animate subjects are never incorporated (Allen, Gardiner, and Frantz 1984: 298). Animacy thus influences the possibility or obligation to use an incorporation construction in Southern Tiwa, and the language prefers inanimate incorporated nouns.

Animacy is also relevant for incorporation in Bininj Kun-Wok. This language makes use of three types of productive, semantically transparent noun incorporation: body-part noun incorporation, generic noun incorporation and secondary predicate incorporation (Evans 2003: 325). Although incorporated secondary predicate nouns may be animate and body-part nouns could be considered animate nouns, generic noun incorporation uses a closed set of around 60 nouns (Evans 2003: 332–333). These are almost all inanimate (Evans 2003: 390). This set includes only three human nouns, *daluk* ‘woman’, *bininj* ‘man’ and *beywurd* ‘child’ and one other animate noun *bod* ‘bee’ (Evans 2003: 473).

Finally, there are also languages in which animacy does not play a role in incorporation. For instance, in Nuu-chah-nulth, both human entities, other animate entities and inanimate entities can be found in noun incorporation constructions (Stonham 2008: 512).

These facts lead us to tentatively postulate the following implicational hierarchy:

- (28) *Incorporation of inanimate nouns* \supset *Incorporation of non-human animate nouns* \supset *Incorporation of human animate nouns*

5.3 The semantic function of the incorporated noun

There seems to be a general preference for the incorporation of nouns in Undergoer function: languages that allow the incorporation of nouns with other semantic functions always allow the incorporation of Undergoers as well (Mithun 1984: 875; Lehmann and Verhoeven 2005: 118).⁹ In addition, it has often been argued in the literature that nouns functioning as Actors cannot be incorporated or are at least very unlikely to be incorporated (Mithun 1984: 863; Gerds 1998: 87; Massam

⁹ Undergoer arguments are alternatively called patients, objects of transitive verbs or subjects of stative verbs in the sources used here.

2009: 1089; Johns 2017).¹⁰ Nevertheless, a few languages have been shown to allow such incorporation. Based on examples from these languages, we speculate that the incorporation of Actors is not impossible but rather appears at the lowest position of the hierarchy regarding the semantic functions of incorporated nouns.

In Palikúr, incorporation is restricted to Undergoer arguments (Aikhenvald and Green 1998: 451). Example (29) shows the incorporation of the Undergoer argument of a transitive verb, while in example (30) the Undergoer argument of an intransitive verb is incorporated. Note that in the latter example the possessor of the Undergoer argument appears as the subject of the verb. Such constructions with possessors occurring as clausal arguments are also known as external possessor constructions (Payne and Barshi 1999: 3, 6).

- (29) *kuri ig hakis-ota-ne han akiw*
 now 3.M rub-eye-CONT.NF thus again
 ‘He continued rubbing his eyes again.’
 (Aikhenvald and Green 1998: 452)

- (30) *eg barew-kug*
 3.F clean-foot
 ‘She is clean-footed.’ (i.e. ‘Her feet are clean.’)
 (Aikhenvald and Green 1998: 452)

In Mapudungun, Undergoers, such as *pullku* ‘wine’ in (31), and Locative modifiers of intransitive verbs, such as *kawellu* ‘horse’ in (32), can be incorporated, while nouns functioning as Actor arguments and other modifiers cannot occur as incorporated nouns (Baker, Aranovich, and Golluscio 2005: 171; Zúñiga 2017: 703–705).¹¹

- (31) *Juan ngilla-pullku-la-y. Iñche ngilla-fi-ñ.*
 Juan buy-wine-NEG-3SG.SBJ.IND I buy-3.OBJ-1SG.SBJ.IND
 ‘Juan didn’t buy the wine. I bought it.’
 (Baker, Aranovich, and Golluscio 2005: 146)

- (32) *püra-kawellu-*
 ascend-horse
 ‘mount a horse’
 (Zúñiga 2017: 705)

¹⁰ Actor arguments are alternatively called agents, subjects of active intransitives, subjects of transitives, or agentive subjects in the sources used here.

¹¹ Locative modifiers are alternatively called location or ground in the sources used here.

Yucatec Maya allows the incorporation of Undergoer arguments, Instrument modifiers and Locative modifiers (Lehmann and Verhoeven 2005: 149). *Che* ‘tree’ in example (1b) above, repeated below, *k’ab* ‘hand’ in example (33) and *pach* ‘back’ in example (34) illustrate the incorporation of nouns with these semantic functions.

- (1) b. *h ch’ak-che’-nah-en ichil in kòol*
 PST cut-tree-COMPL-1SG.ABS in 1SG.POSS milpa
 ‘I chopped trees in my cornfield.’
 (Bricker, Po’ot Yah, and Dzul de Po’ot 1998: 354,
 cited in Lehmann and Verhoeven 2005: 150)
- (33) *in lom-k’ab-t-ik-ech*
 3.SBJ poke-hand/finger-TR-INCOMPL-2SG.ABS
 ‘I poke you with my finger.’
 (Sullivan 1984: 151; Lehmann and Verhoeven 2005: 161)
- (34) *táan in kuch-pach-t-ik in nal*
 PROG 1SG.SBJ load-back-TR-INCOMPL 1SG.POSS corn
 ‘I am carrying my corn on my back (multiple trips).’
 (Bricker, Po’ot Yah, and Dzul de Po’ot 1998, cited in Lehmann and
 Verhoeven 2005: 166)

In Movima, incorporated Undergoer arguments (35), Instrument modifiers (36) and Locative modifiers (37–38) are found as well (Haude 2006: 368, 383, 384).

- (35) *ij wul-a-saniya (ni-kis saniya)*
 2.INTR sow-DR-melon OBL-ART.PL.AB melon
 ‘You sow melon.’
 (Haude 2006: 368)
- (36) *jayna nis-na=is is bari=is di’ jayna*
 DISC wipe.clean-DR=PL.AB ART.PL foot=PL.AB REL DISC
ay’-but-et n-is bereya:-buñ
 smear-BR.mud-APPL OBL-ART.PL tar-BR.mud
 ‘Then they wiped clean their feet (of the macaws), which were smeared
 with tar.’
 (Haude 2006: 385)

- (37) *am-a-siŋ-a=is* *os* *lume'* *n-os* *siŋ-kwa*
 enter-DR-BR.hole-LV=PL.AB ART.N.PST agouti OBL-ART.N.PST BR.hole-ABSS
 'They (the dogs) made the agouti go into the hole.'
 (Haude 2006: 384)

- (38) *kas* *isko-ni-wa* *rey* *ja'* *ena'* *kamay-chorada-neŋ*
 NEG 3PL.AB-VBLZ-NMLZ again just DUR.STD yell-street-APPL
 'Those were not just yelling in the street.'
 (Haude 2006: 384)

South Slavey shows incorporated nouns with various semantic functions. Example (39) shows the incorporation of the Undergoer argument *too* 'night'. Example (40) demonstrates that in this language Locative modifiers can be incorporated, whereas (41) exemplifies Instrument modifier incorporation. In addition, South Slavey Actor arguments can be incorporated, as in example (42).

- (39) *too-go-d-i-tl'e*
 night-area-QU-QU-be.dark
 'It (night) is dark.'
 (Rice 1989: 655, cited in Rice 2008: 386)
- (40) *k'e-ke-e-h-dzoh*
 around-foot-ASP-1SG.SBJ-slide
 'I skated, slid on feet.'
 (Rice 1989: 665, cited in Rice 2008: 387)
- (41) *tse* *na-xee-ye-'a*
 wood back-pack-3.DOBJ-handle.default.object
 'S/he is packing wood back.' (i.e. 'S/he is handling wood by means of pack.')
- (42) *be-se-we-h-xee*
 sleep-1SG.DOBJ-QU-CAUS-kill.SG.OBJ
 'I am sleepy.' (i.e. 'Sleep overcomes me.')
- (Rice 1989: 663, cited in Rice 2008: 387)

Finally, Sora shows the incorporation of Undergoer arguments of transitive verbs (Anderson 2017: 937), such as *dzaʔt* 'snake' in (43). Locative modifiers (44) and Instrument modifiers (45) can be incorporated too. In addition, Actor arguments

of transitive verbs can be incorporated in this language (Anderson 2017: 945–946), as shown in (46).

- (43) *nen nam-dʒaʔt-[t]i-n-aj*
 I catch-snake-NPST-INTR-1.SBJ
 ‘I am catching a snake.’
 (Anderson 2017: 939)
- (44) *lem-dʒeŋ-te-ben-dʒi*
 bow-foot-NPST-2PL.OBJ-3PL.SBJ
 ‘They bow to your feet.’
 (Anderson 2017: 937)
- (45) *nen a-dʒiŋ-in-dʒi=aɔŋ aba:-si-t-ai*
 I 3-foot-NSFX-PL=OBJ wash-hand-NPST-1.SBJ
 ‘I am washing their feet by hand.’
 (Anderson 2017: 937)
- (46) *nem-bud-t-am*
 seize-bear-NPST-2.OBJ
 ‘The bear will seize you.’
 (Anderson 2017: 946)

Table 1 summarizes the possible semantic functions of incorporated nouns in these different languages.

Table 1: Semantic functions of incorporated nouns in six languages.

Language	Undergoer	Other semantic functions (Locative, Instrument)	Actor
Palikúr	+	–	–
Mapudungun	+	+	–
Yucatec Maya	+	+	–
Movima	+	+	–
South Slavey	+	+	+
Sora	+	+	+

Table 1 reflects the hierarchy given in (47):

- (47) *Incorporation of Undergoer* \supset *Incorporation of other semantic functions* \supset
Incorporation of Actor

5.4 Type of dependent with respect to the incorporating verb

Incorporated nouns and incorporating verbs are in a dependency relation of the form head-modifier or predicate-argument. Typically, the incorporated noun is either a modifier or an argument of the incorporating verb (Mithun 2000: 917; Haugen 2015: 414–415).¹² It has been proposed that the incorporation of nominal modifiers only occurs in languages that also show the incorporation of nominal arguments (Mithun 1984: 875; Aikhenvald 2007: 19). More specifically, it seems that all incorporating languages allow the incorporation of transitive (Undergoer) arguments, that languages may additionally incorporate intransitive (Undergoer) arguments, and that languages that show both incorporated transitive and intransitive arguments may optionally also allow incorporated modifiers (Mithun 1984: 875; Haspelmath 2018: 318, fn. 9).¹³

In Kalamang, incorporation appears to be restricted to transitive arguments (Visser p.c.). An example of an incorporation construction in Kalamang is shown in (48).¹⁴

- (48) *ma mua'waruo*
ma muap-paruo
 3SG food-make
 'She is cooking.'
 (Visser, Van Lier, and Olthof 2019)

¹² In addition, incorporated nouns may function as nominal predicates in constructions in which the incorporating verbs function as semi-copula (Hengeveld 1992: 34–39), as in the Ket example in (i).

- (i) *tab-an-t-o-n-aq*
 dog.PL-3PL.AN.SBJ-TC-PST-PST-become
 'They turned into dogs.'
 (Vajda 2017: 918)

In such cases, the incorporating verb may be considered an operator of the nominal predicate, which then functions as the head of the verbal operator.

¹³ Some languages also show the incorporation of arguments into ditransitive verbs. This type of incorporation is addressed in the discussion of morphosyntactic alignment in Section 5.5.

¹⁴ In the isolating language Kalamang, the absence of the accusative marker on a noun that directly precedes a verb shows that it is incorporated (Visser p.c.).

In Nadëb, arguments can be incorporated into transitive and intransitive verbs, as shown in example (49) and (50) respectively.¹⁵

- (49) *ta=tú* *i-tii*
 3SG=food ASP-fish
 ‘He is fishing his (i.e. someone else’s) food.’
 (Weir 1990: 331)

- (50) *ih=tug* *da-tés*
 1SG=tooth TH-hurt
 ‘I have toothache.’ (lit. ‘I tooth-hurt.’)
 (Weir 1990: 323)

These types of noun incorporation are the only possible types in Nadëb (Weir 1990: 325), which entails that modifier incorporation is not found in this language.

In Hokkaido Ainu, incorporation is also limited to nouns functioning as transitive or intransitive arguments. In this language, four types of incorporation are recognized: transitive Undergoer incorporation, intransitive argument incorporation in which the argument is a natural phenomenon noun, intransitive argument incorporation in which the argument is a body-part in its possessive form and transitive Actor incorporation in which the incorporated Actor is a (super)natural phenomenon or insect noun (Bugaeva 2017: 897).

By contrast, in Chukchi both incorporated transitive arguments, incorporated intransitive arguments and incorporated modifiers are found. Firstly, in example (51), the incorporated noun *wala* ‘knife’ functions as the Undergoer argument of the transitive incorporating verb *mna* ‘sharpen’.

- (51) *Mə-wala-mna-rkən*
 1PL.S.INT-knife-sharpen-1PL.S
 ‘Let us sharpen the knives.’
 (Skorik 1948: 73, cited in Spencer 1995: 445)

Secondly, the incorporated noun *ətʔa* ‘mother’ in example (52) is the intransitive Undergoer argument of the intransitive incorporating verb *wʔe* ‘die’.

¹⁵ In Nadëb, incorporated nouns, which precede the stem of the incorporating verb, follow the pronouns that appear as verbal proclitics, such as *ta=* in (49) (Weir 1990: 331). An incorporated noun and an incorporating verb thus form a single morphosyntactic word together. However, the noun and verb remain independent phonological words (see Section 6.3).

- (52) *atlæg-ən atlʔa-wʔe-gʔe*
 father-ABS mother-die-3SG.S
 ‘Father’s mother died (on him).’
 (Polinskaja and Nedjalkov 1987: 259, cited in Spencer 1995: 450)

Thirdly, in example (53), the incorporated noun *ənnə* ‘fish’ is a modifier that in a clause without incorporation would take so-called instrumental case-marking (Skorik 1948: 72, cited in Spencer 1995: 457).

- (53) *[. . .] ənnə-tke-rkən*
 fish-smell-3SG.S
 ‘[. . .] (it) smells of fish.’
 (Skorik 1948: 72, cited in Spencer 1995: 457)

Like Chukchi, Ket shows the incorporation of arguments that normally function as transitive Undergoers, exemplified in (54), the incorporation of arguments of intransitive verbs, as in example (55), as well as the incorporation of modifiers, shown in example (56).¹⁶

- (54) *da=nan-si-bed*
 3.F.SBJ=bread-PRS-make
 ‘She is making bread.’
 (Vajda 2017: 912)
- (55) *ul-a-ta*
 rain-PRS-falls
 ‘It rains.’
 (Vajda 2017: 921)
- (56) *assano ke’d tib d=sal-a-t-a-kit*
 hunting person dog 3.SBJ=tobacco-3SG.M.OBJ-TC-PRS-rub
 ‘The hunter “tobaccoed” the dog (to rid it of fleas).’
 (Vajda 2017: 916)

¹⁶ Note that this sentence cannot be read as ‘the hunter rubbed tobacco on the dog’, as ‘the dog’ is cross-referenced on the verb as an object.

Finally, Western Frisian also shows incorporated arguments and modifiers (Dijk 1997: 94, 136, 162). Note, however, that the incorporation of intransitive incorporated arguments is limited to a few isolated cases in sentences with expletive subjects, such as the one in example (57) (Dijk 1997: 162).

- (57) *It begjint te snie-wiskjen*
 It begins to snow-fly
 ‘The snow begins to fly.’
 (Dijk 1997: 162)

Table 2 shows the types of dependents found in incorporation constructions in the different languages.

Table 2: Types of incorporated dependents in five languages.

Language	Transitive argument	Intransitive argument	Modifier
Kalamang	+	–	–
Nadëb	+	+	–
Hokkaido Ainu	+	+	–
Chukchi	+	+	+
Ket	+	+	+
Western Frisian	+	+	+

The implicational hierarchy that may be derived from Table 2 is given in (58).

- (58) *Incorporation of transitive arguments* \supset *Incorporation of intransitive arguments*
 \supset *Incorporation of modifiers (adjuncts)*

Interestingly, in cases in which the only argument of an intransitive verb is incorporated, the incorporation construction, i.e. a single Morphosyntactic Word at ML, may correspond to a complete Configurational Property at RL. In such cases, noun incorporation creates a transparent match between a single unit at RL and a single unit at ML. In this respect, there is a contrast between the incorporation of arguments into intransitive verbs on the one hand and the incorporation of arguments into transitive verbs and the incorporation of modifiers on the other hand. Note finally that a language’s ability to incorporate full Configurational Properties also adds to this language’s degree of polysynthesis, in that a relatively high unit at RL corresponds to a single Word at ML (see Genee 2018: 257–260).

5.5 Morphosyntactic alignment

In FDG, the selection of arguments with specific semantic functions in certain privileged syntactic positions is handled by the interface between RL and ML as well. For instance, at the Clause layer, the choice of arguments with certain semantic functions to fulfill the role of Subject and Object is handled by this interface. A language shows an accusative or ergative alignment if there is neutralization between the argument of an intransitive verb and the Actor or Undergoer argument of a transitive verb. Furthermore, on the basis of neutralization between the Undergoer argument of a transitive verb and the Undergoer or Locative argument of a ditransitive verb, languages can be characterized as either indirective or secundative.

Similarly, at the Morphosyntactic Word layer, similarly the choice of arguments that can be incorporated is an issue of alignment. The alignment system of a language for noun incorporation may simply depend on the interpersonal or representational characteristics of the arguments, but may also be of the morphosyntactic type. The following examples demonstrate that the different morphosyntactic alignment systems distinguished for the Clause layer are found at the Morphosyntactic Word layer, i.e. in noun incorporation, as well.

In Bininj Kun-Wok the only argument of an intransitive (59–60) and the Undergoer argument of a transitive verb (61) can be incorporated, while Actor arguments of transitive verbs cannot (Evans 2003: 455, 468–471).

(59) *Ga-wardde-djabdi.*

3-rock-stand.up.straight.NPST

‘There is a rock standing up straight.’

(Evans 2003: 451)

(60) *Ga-yau-dolga-n.*

3-baby/child-get.up.NPST

‘The baby (kangaroo) gets out of its pouch.’

(Evans 2003: 468)

(61) *Al-ekge al-gohbanj ba-gurlah-bimbu-ni.*

F-DEM II-old.person 3>3.PST-skin-paint-PST.IPFV

‘That old lady used to paint buffalo hides.’

(Evans 2003: 451)

Note that, in the case of intransitive verbs, both Actors and Undergoers can be incorporated (Evans 2003: 468), which shows that the alignment system for incor-

poration in Bininj Kun-Wok cannot be explained solely on the basis of semantic functions. Thus, the alignment system for noun incorporation in this language is not representational in nature, as it neutralizes the semantic functions Actor and Undergoer. Rather, this language has a morphosyntactic alignment system of the ergative type (see also Hengeveld and Mackenzie 2008: 408).

Kalamang, on the other hand, has an accusative system, as it allows the incorporation of transitive Undergoers, as exemplified in (48) in Section 5.4, but not of intransitive arguments (Visser p.c.).

With respect to ditransitive verbs, noun incorporation is typically limited to Undergoer arguments, such that most languages have an indirective alignment system (Malchukov, Haspelmath, and Comrie 2010: 42). Thus, Southern Tiwa incorporates the Undergoer arguments of both transitive (62) and ditransitive (63) verbs (Allen, Gardiner, and Frantz 1984: 293, 303; see also Hengeveld and Mackenzie 2008: 408–409):

- (62) *Ti-seuan-mũ-ban.*
 1SG>SG-man-see-PST
 ‘I saw the/a man.’
 (Allen, Gardiner, and Frantz 1984: 294)

- (63) *Ti-‘u‘u-wia-ban ĩ-‘ay.*
 1SG>SG-baby-give-PST 2SG-ALL
 ‘I gave the baby to you.’
 (Allen, Gardiner, and Frantz 1984: 303)

Nivkh, on the other hand, has secundative alignment in noun incorporation, as the Locative of a ditransitive verb (64) can be incorporated, just like the Undergoer of a transitive verb, as shown in (65) (Mattissen 2003: 137, 140; see also Hengeveld and Mackenzie 2008: 408–409):

- (64) *objezdʒik k'e atak-asqam-ɖ*
 bay.watcher net grandfather-take.away-IND
 ‘The bay watcher took the net away from grandfather.’
 (Otaina 1978: 34, cited in Mattissen 2003: 142)

- (65) *atak k'e-seu-ɖ*
 grandfather net-dry-IND
 ‘Grandfather dried the net.’
 (Otaina 1978: 34, cited in Mattissen 2003: 137)

Finally, in Hokkaido Ainu, ditransitive verbs may sometimes incorporate both their Undergoer argument and their Locative argument at the same time (Bugaeva 2017: 899), as in (66).

- (66) *cep-ya-o-kuta=an*
 fish-shore-APPL-throw=INDF.S
 ‘I threw the fish (he caught) onto the shore.’
 (Nakagawa, Bugaeva, and Kobayashi 2016, cited in Bugaeva 2017: 883)

Based on examples like (66), we conclude that languages may also have a neutral alignment system for noun incorporation.

The alignment system of a language in its incorporation strategies is not predictable from other properties and therefore has to be stipulated as a basic property of the language, as in (67).

- (67) *Accusative / Ergative / Neutral*
Indirective / Secundative / Neutral

5.6 Relationality

In many languages, relational nouns or, more specifically, body-part nouns are either the only type of nouns that can be incorporated or the type of nouns that is incorporated most frequently or easily (Mithun 1986: 383; Aikhenvald 2007: 20; Massam 2009: 1090). Moreover, in some languages incorporation is limited to constructions in which a body-part noun or another relational noun is incorporated and its (inalienable) possessor is expressed as an argument of the incorporating verb, i.e. as an external possessor.

In Palikúr, incorporation is limited to body-part nouns (Aikhenvald and Green 1998: 451; Aikhenvald 2007: 20). These nouns are obligatory possessed, and when they are incorporated, their possessor is generally expressed as the direct object, in the case of a transitive incorporating verb, or as the subject, in the case of an intransitive incorporating verb (Aikhenvald and Green 1998: 451–452). An example of an incorporated body-part noun with its possessor expressed as direct object is shown in (68), in which the noun *ot* ‘eye’ is incorporated and its 3rd person singular possessor is expressed as the verbal suffix *-gi*. The incorporation of a body-part noun and the expression of its possessor as subject was exemplified in (30) above, repeated below.

(68) *ig-kis hapis patuk-ot-bet-h-e-gi*
 3.M-PL shoot burst-eye-MULT-INTS-COMPL-3.M
 ‘They shot his eyes out.’ (lit. ‘They eye-shot-him.’)
 (Aikhenvald and Green 1998: 452)

(30) *eg barew-kug*
 3.F clean-foot
 ‘She is clean-footed.’ (i.e. ‘Her feet are clean.’)
 (Aikhenvald and Green 1998: 452)

In contrast to Palikúr, Yucatec Maya does not restrict incorporation to body-part nouns or relational nouns. This language shows both the incorporation of body-part nouns, such as *k’ab* ‘hand’ and *pach* ‘back’ in example (33) and (34) above, and the incorporation of non-body-part nouns, such as *che* ‘tree’ in example (1b). The examples are repeated here for convenience.

(33) *in lom-k’ab-t-ik-ech*
 3.SBJ poke-hand/finger-TR-INCOMPL-2SG.ABS
 ‘I poke you with my finger.’
 (Sullivan 1984: 151; Lehmann and Verhoeven 2005: 161)

(34) *táan in kuch-pach-t-ik in nal*
 PROG 1SG.SBJ load-back-TR-INCOMPL 1SG.POSS corn
 ‘I am carrying my corn on my back (multiple trips).’
 (Bricker, Po’ot Yah, and Dzul de Po’ot 1998, cited in Lehmann and Verhoeven 2005: 166)

(1) b. *h ch’ak-che’-nah-en ichil in kòol*
 PST cut-tree-COMPL-1SG.ABS in 1SG.POSS milpa
 ‘I chopped trees in my cornfield.’
 (Bricker, Po’ot Yah, and Dzul de Po’ot 1998: 354, cited in Lehmann and Verhoeven 2005: 150)

Based on these facts we tentatively suggest the hierarchy given in (69).

(69) *Incorporation of relational nouns* \supset *Incorporation of non-relational nouns*

6 The ML-PL interface

6.1 Introduction

PL receives its input from ML. It is here that it is determined how the incorporated noun is realized segmentally and prosodically. We therefore consider here the following issues:

- (i) Type of head: is it suppletive or non-suppletive?
- (ii) The phonological layer of the incorporated noun: is it a separate Phonological Word (Pw) or is it part of the verbal Pw?

In the area of the interface between ML and PL no hierarchies have been proposed that would capture the cross-linguistic constraints on incorporation. Rather, it seems that languages use two basic settings in the interaction between these two levels.

6.2 Type of head

In some languages, (some) nouns take suppletive or phonologically alternate forms when they are incorporated, while in other languages incorporated nouns have the same form as unincorporated ones (Mithun 1984: 876; Aikhenvald 2007: 13; Caballero et al. 2008: 387–388). In Sora, incorporated nouns have special forms, called “combining forms”, which are monosyllabic or mono-moraic counterparts of the “full forms” that are used in contexts without incorporation (Anderson 2007: 175). The full forms typically show some similarity to the combined forms in that the full forms often appear to be derived from the corresponding combining forms by either reduplication, prefixation, suffixation or compounding (Anderson 2007: 175). For instance, the noun meaning ‘banana’ has the full form *kānte* and the combining form *-te*, as shown in (70).

- (70) a. *jen kānte-n dzum-t-ai*
 I banana-NSFX eat-NPST-1.SBJ
 ‘I am eating a banana.’
- b. *jen dzum-te-ti-n-ai*
 I eat-banana-NPST-INTR-1.SBJ
 ‘I am eating a banana.’
 (Anderson 2017: 939)

Incorporated body-part nouns in Palikúr either have the same form as unincorporated body-part nouns or alternate forms that are clearly related to the unincorporated body-part nouns (Aikhenvald and Green 1998: 451). The set of body-part nouns that can be incorporated is presented in Table 3, in which both the independent and incorporated forms are included.

Table 3: Forms of unincorporated body-part nouns, body-part nouns incorporated into stative verbs and body-part nouns incorporated into transitive verbs in Palikúr (Aikhenvald and Green 1998: 451).

Form of unincorporated noun	Form of noun incorporated into a stative verb	Form of noun incorporated into a transitive verb
<i>duk</i> ‘chest’	- <i>duk</i>	- <i>duka</i>
<i>kugku</i> ‘foot’	- <i>kug</i>	- <i>kuga</i>
<i>wak</i> ‘hand’	- <i>ok</i>	- <i>oka</i>
<i>tew</i> ‘head’	- <i>tiw</i>	- <i>tew</i>
<i>utyak</i> ‘eye’	- <i>ot</i>	-(<i>h</i>) <i>ot(a)</i>
<i>biy</i> ‘mouth’	- <i>bi</i>	- <i>biya</i>
<i>tip</i> ‘top (lid)’	- <i>tip</i>	- <i>tipa</i>

Finally, in Mapudungun incorporated and unincorporated nouns have the same form, as shown by the nouns *wün* ‘snout’ and *waka* ‘cow’ in example (71) and (72) respectively.

- (71) *Püff pi nga ñi wün ngürü,*
 paff say.3SG.SBJ PRT 3.POSS snout fox
wichaf-wün-tu-y [. . .].
 become.big-snout-RE-3SG.SBJ.IND
 ‘The fox said “paff!” with his snout, (and) his snout became big again [. . .].’
 (Salas 1992: 303–304, cited in Baker, Aranovich, and Golluscio 2005: 167)

- (72) a. *Ñi chao kintu-le-y ta.chi pu waka.*
 my father seek-PROG-3SG.SBJ.IND the COLL cow
 ‘My father is looking for the cows.’
- b. *Ñi chao kintu-waka-le-y.*
 my father seek-cow-PROG-3SG.SBJ.IND
 ‘My father is looking for the cows.’
 (Salas 1992: 195, cited in Baker, Aranovich, and Golluscio 2005: 139)

Whether an incorporating language displays suppletive forms cannot be predicted from other properties of the language. The grammar therefore needs a basic setting as in (73).

- (73) *Incorporated nouns have suppletive forms / Incorporated nouns have non-suppletive forms*

6.3 The phonological layer of the incorporated noun

Incorporation constructions may or may not form single Phonological Words (Mithun 1984: 849; Aikhenvald 2007: 14–15; Caballero et al. 2008: 385–386). In some languages, there is clear evidence for the status of incorporation structures as Phonological Words. For instance, in Chukchi the vowel harmony rules that operate in phonological words are also at work in incorporation constructions (Mithun 1984: 875; Spencer 1995: 445). This is shown in example (74), part of which repeats example (51).

- (74) a. *Wala-t mə-mne-rkənet*
 knife-ABS.PL 1PL.A.INT-sharpen-3PL.P
 ‘Let us sharpen the knives.’
- b. *Me-wala-mna-rkən*
 1PL.S.INT-knife-sharpen-1PL.S
 (Skorik 1948: 73, cited in Spencer 1995: 445)

The recessive vowel *e* in the verbal stem *mne* ‘sharpen’ changes into the dominant vowel /a/ under influence of the dominant *a* vowels in the incorporated noun in (74b).

In Cayuga, an incorporated noun and its incorporating verb also form a single phonological word. In this language, phonological words have stress on their fourth syllable, and this pattern also holds for incorporation constructions (Mithun 1994, cited in Aikhenvald 2007: 14).

In other languages, however, incorporation constructions do not form single Phonological Words, even though they constitute Morphosyntactic Words. In Yimas, for instance, incorporated nouns and their incorporating verbs may both carry stress like independent phonological words (Foley 1991: 84). Thus, in example (75), both the incorporated deverbal noun /wacakm/ and the verb including the stem /ti/ carry phonological word stress.

- (75) *mamam p-na-waca-k-m-ti-n*
 sore.VII.SG VII.SG.S-DEF-small-IRR-VII.SG-become-PRS
 ‘The sore is getting smaller.’
 (Foley 1991: 83)

In addition, the form of the class and number agreement marker on the incorporated noun /wacakm/ shows that this incorporated noun is an independent phonological word. The marker takes the form /m/, which is the allomorph that is used word-finally, rather than the form /mp/, which is the allomorph that normally occurs in word-medial position (Foley 1991: 84).

In Nadëb, the position of verbal clitics shows that an incorporated noun and an incorporating verb form a single morphosyntactic word (Weir 1990: 330–331). Nevertheless, just like in Yimas, the noun and the verb remain independent phonological words in terms of stress placement (Weir 1990: 323, 330–331). In example (49) above, repeated here, for instance, the verbal proclitic *ta* appears in front of the incorporated noun, thus showing that the noun *tú* ‘food’ is part of the verb with the stem *tii* ‘fish’ morphosyntactically. At the same time, nouns and verbs in incorporation constructions are stressed independently and can therefore be considered independent phonological words.

- (49) *ta=tú i-tii*
 3SG=food ASP-fish
 ‘He is fishing his (i.e. someone else’s) food.’
 (Weir 1990: 331)

Whether or not incorporated nouns in a particular form separate Phonological Words cannot be predicted from other properties of the language. It therefore has to be specified as a basic setting in the grammar, as given in (76).

- (76) *Incorporated nouns as separate Pw / Incorporated nouns as part of the verbal Pw*

7 A worked example

7.1 Introduction

One complete set of interface conditions for noun incorporation can be exemplified for Kalaallisut on the basis of the constructions in example (77–81). In order to show how these interface conditions are dealt with in FDG, we provide the

- IL: (A_i: [(F_i: DECL (F_i)) (P_i)_S (P_i)_A (C_i: [(T_i) (R_i)] (C_i))] (A_i))
 RL: (p_i: (ep_i: (e_i: (sim f_i: [(f_i: palasi (f_i)) (x_i)_U] (f_i)) (e_i)) (ep_i)) (p_i))
 ML: (Cl_i: [(Vp_i: (Vw_i: [(Ns_i: palasi (Ns_i)) (Vr_i: (r)palug (Vr_i)) (Aff_i: vuq (Aff_i))] (Vw_i)) (Vp_i))] (Cl_i))
 PL: (IP_i: (PW_i: /palasirpaluppuq/ (PW_i)) (IP_i))

- (80) *atisa-ssip-parma*
 clothes-give-2SG>1SG
 ‘You gave me clothes.’
 (Fortescue 1984: 323)

- IL: (A_i: [(F_i: DECL (F_i)) (P_i)_S (P_i)_A (C_i: [(T_i) (+id R_i: [-S, +A]) (-id R_j: (T_j) (R_j)) (+id R_k: [+S, -A])] (C_i))] (A_i))
 RL: (p_i: (ep_i: (e_i: (f_i: [(f_i: ssit (f_i)) (1 x_i)_A (x_j: (f_j: atisaq (f_j)) (x_j)_U (1 x_k)_I] (f_i)) (e_i)) (ep_i)) (p_i))
 ML: (Cl_i: [(Vp_i: (Vw_i: [(Ns_i: atisaq (Ns_i)) (Vr_i: ssit (Vr_i)) (Aff_i: varma (Aff_i))] (Vw_i)) (Vp_i))] (Cl_i))
 PL: (IP_i: (PW_i: /atisassipparma/ (PW_i)) (IP_i))

- (81) *Esta nutaa-mik aalisagar-si-vuq.*
 Esther fresh-INS.SG fish-get-3SG.IND
 ‘Esther got (a) fresh fish.’
 (van Geenhoven 1998: 18)

- IL: (A_i: [(F_i: DECL (F_i)) (P_i)_S (P_i)_A (C_i: [(T_i) (R_i: Esta (R_i)) (-id R_j: (T_j) (T_k) (R_j))] (C_i))] (A_i))
 RL: (p_i: (ep_i: (e_i: (f_i: [(f_i: si (f_i)) (x_i)_A (1 x_j: (f_j: aalisagaq (f_j)) (x_j: (f_k: nutaaq (f_k)) (x_j)_U] (f_i)) (e_i)) (ep_i)) (p_i))
 ML: (Cl_i: [(Np_i: (Nw_i: Esta (Nw_i)) (Np_i)) (Np_j: (Nw_j: [(Ns_j: nutaaq (Ns_j)) (Aff_j: mik (Aff_j))] (Nw_j)) (Np_j)) (Vp_i: (Vw_i: [(Ns_j: aalisagaq (Ns_j)) (Vr_i: si (Vr_i)) (Aff_j: vuq (Aff_j))] (Vw_i)) (Vp_i))] (Cl_i))
 PL: (IP_i: [(PW_j: /esta/ (PW_I)) (PW_j: /nuta:mik/ (PW_j)) (PW_k: /a:lisagarsivuq/ (PW_k))] (IP_i))

7.2 The IL-ML interface

Starting with the IL-ML interface, we observe that in Kalaallisut both referential nouns, such as *panik* ‘daughter’ ((R_j) in (77)) and *Nuuk* ‘Godthaab’ ((R_j) in (78)), and non-referential nouns, like the predicatively used noun *palasi* ‘priest’ ((T_i) in (79)), can be incorporated. Incorporated referential nouns are usually common nouns, but referential proper names are also found in incorporation construc-

tions in Kalaallisut, as shown by example (78), where *Nuuk* is the direct head of (R_j). The language also shows several possibilities with respect to the pragmatic operators of referential incorporated nouns. Firstly, the noun *panik* ‘daughter’ in (77) “cannot be understood as definite” (Kristoffersen 1992: 156), hence the operator $-id$ on (R_j), whereas the noun *Nuuk* in (78), being a proper name, has a referent that is presented as identifiable for the addressee (Sadock 1980: 314), hence the operator $+id$ on (R_j). Secondly, although *panik* ‘daughter’ in (77) “can refer to [a] specific [entity]” (Kristoffersen 1992: 156), incorporated nouns in Kalaallisut can also refer to non-specific entities (Fortescue 1984: 300). In addition, while non-referential incorporated nouns like *palasi* ‘priest’ in (79) lack a pragmatic function, referential incorporated nouns in Kalaallisut, as illustrated in Section 4.5, may either be focal or backgrounded.

The basic settings and position on the hierarchies for the IL-ML interface for noun incorporation in Kalaallisut are summarized in (82–86).

- (82) *Incorporation of referential nouns / Incorporation of non-referential nouns / Incorporation of both referential and non-referential nouns*
- (83) *Incorporation of common nouns* \supset *Incorporation of proper names*
- (84) *Incorporation of $-id$ nouns* \supset *Incorporation of $+id$ nouns*
- (85) *Incorporation of $-s$ nouns* \supset *Incorporation of $+s$ nouns*
- (86) *Incorporation of nouns with Background function* \supset *Incorporation of nouns with Focus function*

7.3 The RL-ML interface

The examples in (77–81) also illustrate the RL-ML interface conditions for noun incorporation in Kalaallisut. Firstly, the examples include both the incorporated non-modifiable f-noun *palasi* ‘priest’ ((f_i) in (79)) and the incorporated α -noun *panik* ‘daughter’ that is modified by *pinnir* ‘beautiful’ ((x_i) in (77)). Secondly, incorporated α -nouns can both designate animate entities, as with (x_j) in example (77) and (x_j) in (81), and inanimate entities, as exemplified with (l_i) in (78) and (x_j) in (80). Note that animate incorporated entities may both be human and non-human: the verb *-qar* ‘have’ incorporates the human noun *panik* ‘daughter’ in example (77), while the verb *si* ‘get’ in (81) incorporates the non-human noun *aalisagaq* ‘fish’. Thirdly, the constructions in (77), (80) and (81) show an incorpo-

rated noun with the semantic function of Undergoer ($(x_j)_U$), while *Nuuk* in (78) is an incorporated noun that has the semantic function of Locative ($(l_i)_L$). Crucially, Sadock (2003: 31, 46) notes that an incorporated noun in Kalaallisut always corresponds to a verb's "semantic object", with the exception of predicatively used incorporated nouns like *palasi* 'priest' in (79). From this we infer that the incorporation of nouns with the semantic function of Actor is not possible. In addition, this information indicates that the incorporation of intransitive arguments and modifiers is excluded. Correspondingly, the morphosyntactic alignment system for noun incorporation in Kalaallisut is accusative, as arguments of intransitive verbs and Actor arguments of transitive verbs contrast with Undergoer arguments of transitive verbs in not being able to be incorporated. Kalaallisut also predominantly shows neutralization between Undergoer arguments of transitive and ditransitive verbs: in the same way as transitive verbs, ditransitive verbs tend to incorporate their Undergoer arguments, as illustrated in example (80). The language thus shows a primarily accusative-indirective morphosyntactic alignment system in noun incorporation. Interestingly, at the clausal layer Kalaallisut generally uses an ergative-secundative system for case-marking (Fortescue 1984: 80, 82; Malchukov 2013: 283), i.e. in Kalaallisut the morphosyntactic alignment system for the Clause and Word layer differ. Finally, the examples show that both relational nouns, such as *panik* 'daughter' (x_j) in (77), and non-relational nouns, such as *Nuuk* (l_i) in (78), can be incorporated in Kalaallisut.

The basic settings and position on the hierarchies for the RL-ML interface for noun incorporation in Kalaallisut can thus be presented as in (87–92).

- (87) *Incorporation of f-nouns / Incorporation of α -nouns / **Incorporation of both f-nouns and α -nouns***
- (88) ***Incorporation of inanimate nouns** \supset **Incorporation of non-human animate nouns** \supset **Incorporation of human animate nouns***
- (89) ***Incorporation of Undergoer** \supset **Incorporation of other semantic functions** \supset **Incorporation of Actor***
- (90) ***Incorporation of transitive arguments** \supset **Incorporation of intransitive arguments** \supset **Incorporation of modifiers (adjuncts)***
- (91) ***Accusative** / Ergative / Neutral
Indirective / Secundative / Neutral*
- (92) ***Incorporation of relational nouns** \supset **Incorporation of non-relational nouns***

7.4 The ML-PL interface

The examples in (77–81) also provide information about the two basic settings for Kalaallisut that are relevant for the ML-PL interface. Incorporated nouns in Kalaallisut do not take suppletive forms: they simply correspond to the stems of independently used nouns (Sadock 1985: 399).¹⁷ Finally, an incorporated noun and its incorporating verb form a single phonological word in Kalaallisut, which can be shown on the basis of several morphophonological processes (Sadock 2003: 12–19). For instance, the incorporated noun *panik* ‘daughter’ in (77) loses its final consonant /k/ under influence of the word-internal following /q/ of the verbal Root *-qar* ‘have’, while the incorporating verb *-(r)paluq* ‘be like’ in (79) takes the form /rpaluq/ rather than /paluq/ because it is attached to a nominal stem that ends in a vowel, i.e. *palasi* ‘priest’.

The basic settings for the ML-PL interface for noun incorporation in Kalaallisut are shown in (93) and (94).

(93) *Incorporated nouns have suppletive forms* / ***Incorporated nouns have non-suppletive forms***

(94) *Incorporated nouns as separate Pw* / ***Incorporated nouns as part of the verbal Pw***

7.5 Mappings

When comparing the representations at the various levels in (77)–(81) it is remarkable that, although some constructions show one-to-one mappings between IL, RL, ML and PL, in other constructions mismatches can be found. Interestingly, the construction in (81) shows one-to-one mappings between IL and RL on the one hand, and between ML and PL on the other, but mismatches occur between IL/RL on the one hand and ML/PL on the other. This is shown in (95):

(95) *Esta nutaa-mik aalisagar-si-vuq.*
 Esther fresh-INS.SG fish-get-3SG.IND
 ‘Esther got (a) fresh fish.’
 (van Geenhoven 1998: 18)

¹⁷ More rarely, incorporated nouns may correspond to independent inflected nouns (Sadock 1980: 315), but such incorporated nouns are not found in the examples in (77–81).

That is, in example (95) the mismatches are purely a matter of Encoding. In this example a single Referential Subact (R_j) at IL maps onto a single Individual (x_i) at RL. The two Ascriptive Subacts (T_j) and (T_k) that make up (R_j), map onto one Property, (f_j) and (f_k), each. So there is a straightforward mapping from IL to RL. In the step from IL/RL to ML things are radically different. The Property (f_j) and the head of its Undergoer argument (f_j) form a single Verbal word (Vw_i) at ML. The modifier of the Undergoer argument (f_k) forms a single Noun phrase (Np_i), and the Actor argument (x_i) constitutes another Noun phrase (Np_i). The elements that make up the Verbal word at ML thus do not make up any unit at RL. The mapping from ML to PL is then straightforward again, as Morphosyntactic Words at ML correspond to Phonological Words at PL.

8 Conclusions

This paper has shown that the constraints on noun incorporation require a multi-level analysis, such as that provided by FDG. As opposed to other models of grammar, FDG posits four levels of analysis, which provide the means to capture the pragmatic, semantic, morphological, and phonological properties of incorporated nouns. All of these have been shown in this paper to be important in understanding the differences between noun incorporation constructions among languages. The operations connecting these levels in FDG furthermore provide the means to define the constraints that govern the possible mappings between all these levels in incorporation in a given language. By defining these constraints as a combination of typological hierarchies and basic settings, the cross-linguistic variation in the field of noun incorporation can be described in a systematic way.

Furthermore, in studying how combinations of properties from all levels of analysis play a role in the system of noun incorporation in a single language, Kalaallisut, in Section 7, we have demonstrated that the basic distinction in FDG between Formulation and Encoding, i.e. between IL/RL on the one hand and ML/PL on the other, is neatly reflected in the mismatches that incorporation can bring along.

References

- Aikhenvald, Alexandra Y. 2007. Typological distinctions in word-formation. In Timothy Shopen (ed.), *Language typology and syntactic description*, vol. 3: *Grammatical categories and the lexicon*, 2nd edn., 1–65. Cambridge: Cambridge University Press.
- Aikhenvald, Alexandra Y. & Diana Green. 1998. Palikur and the typology of classifiers. *Anthropological Linguistics* 40(3). 429–480.
- Allen, Barbara J., Donna B. Gardiner & Donald G. Frantz. 1984. Noun incorporation in Southern Tiwa. *International Journal of American Linguistics* 50(3). 292–311.
- Anderson, Gregory D. S. 2007. *The Munda verb: Typological perspectives* (Trends in Linguistics: Studies and Monographs 174). Berlin: Mouton de Gruyter.
- Anderson, Gregory D. S. 2017. Polysynthesis in Sora (Munda) with special reference to noun incorporation. In Michael Fortescue, Marianne Mithun & Nicholas Evans (eds.), *The Oxford handbook of polysynthesis* (Oxford Handbooks in Linguistics), 930–947. Oxford: Oxford University Press.
- Arnhold, Anja. 2014. Prosodic structure and the focus realization in West Greenlandic. In Sun-Ah Jun ed., *Prosodic typology II*, 216–251. Oxford: Oxford University Press.
- Baker, Mark C. 1988. *Incorporation: A theory of grammatical function changing*. Chicago, IL: Chicago University Press.
- Baker, Mark C. 1996. *The polysynthesis parameter* (Oxford Studies in Comparative Syntax). New York, NY: Oxford University Press.
- Baker, Mark C., Roberto Aranovich & Lucía A. Golluscio. 2005. Two types of syntactic noun incorporation: Noun incorporation in Mapudungun and its typological implications. *Language* 81(1). 138–176.
- Bittner, Maria (2007), Piuatsaq's near fatal adventure. <http://www.rci.rutgers.edu/~mbittner/ktxt.html>.
- Bochnak, M. Ryan & Alice Rhomieux. 2013. Limited noun incorporation in Washo. *International Journal of American Linguistics* 79(2). 253–281.
- Borik, Olga & Berit Gehrke. 2015. An introduction to the syntax and semantics of pseudo-incorporation. In Olga Borik & Berit Gehrke (eds.), *The syntax and semantics of pseudo-incorporation* (Syntax & Semantics 40), 1–43. Leiden: Brill.
- Bugaeva, Anna. 2017. Polysynthesis in Ainu. In Michael Fortescue, Marianne Mithun & Nicholas Evans (eds.), *The Oxford handbook of polysynthesis* (Oxford Handbooks in Linguistics), 882–905. Oxford: Oxford University Press.
- Caballero, Gabriela, Michael J. Houser, Nicole Marcus, Teresa McFarland, Anne Pycha, Maziar Toosarvandani & Johanna Nichols. 2008. Nonsyntactic ordering effects in noun incorporation. *Linguistic Typology* 12(3). 383–421.
- Chomsky, Noam & Howard Lasnik. 1993. The theory of Principles and Parameters. In Joachim Jacobs, Arnim von Stechow, Wolfgang Sternefeld & Theo Vennemann (eds.), *Syntax: An international handbook of contemporary research*, vol. 1, 506–569. Berlin & New York: Mouton De Gruyter.
- DeClaire, Ryan, Alana Johns & Ivona Kučerova. 2017. On optionality in Mohawk noun incorporation. *Toronto Working Papers in Linguistics* 39. 1–10.
- Dijk, Siebren. 1997. *Noun incorporation in Frisian*. Groningen: Rijksuniversiteit Groningen dissertation.

- Evans, Nicholas. 2003. *Bininj Gun-Wok: A pan-dialectical grammar of Mayali, Kunwinjku and Kune* (Pacific Linguistics 541). Canberra: Pacific Linguistics, Research School of Pacific and Asian Studies, The Australian National University.
- Foley, William A. 1991. *The Yimas language of New Guinea*. Stanford, CA: Stanford University Press.
- Fortescue, Michael. 1984. *West Greenlandic* (Croom Helm Descriptive Grammars). London: Croom Helm.
- Geenhoven, Veerle van. 1998. *Semantic incorporation and indefinite descriptions: Semantic and syntactic aspects of noun incorporation in West Greenlandic* (Dissertations in Linguistics). Stanford, CA: Center for the Study of Language and Information Publications.
- Genee, Inge. 2018. Measuring polysynthesis: A Functional Discourse Grammar approach. In Evelien Keizer & Hella Olbertz (eds.), *Recent developments in Functional Discourse Grammar* (Studies in Language Companion Series), 233–272. Amsterdam: Benjamins.
- Gerdts, Donna B. 1998. Incorporation. In Andrew Spencer & Arnold M. Zwicky (eds.), *The handbook of morphology* (Blackwell Handbooks in Linguistics), 84–100. Oxford: Blackwell.
- Givón, T. 2013. *Ute texts* (Culture and Language Use: Studies in Anthropological Linguistics 7). Amsterdam & Philadelphia: John Benjamins.
- Gronemeyer, Claire. 1996. Noun incorporation in Hopi. *Lund University Working Papers in Linguistics* 45. 25–44.
- Haspelmath, Martin. 2018. The last word on polysynthesis: A review article. *Linguistic Typology* 22(2). 307–326.
- Haude, Katharina. 2006. *A grammar of Movima*. Nijmegen: Radboud Universiteit Nijmegen dissertation.
- Haugen, Jason D. 2015. Incorporation. In Peter O. Müller, Ingeborg Ohnheiser, Susan Olsen & Franz Rainer (eds.), *Word-formation: An international handbook of the languages of Europe*, vol. 1 (Handbücher zur Sprach- und Kommunikationswissenschaft 40(1)), 413–434. Berlin: De Gruyter.
- Hengeveld, Kees. 1992. *Non-verbal predication: Theory, typology, diachrony* (Functional Grammar Series 15). Berlin: Mouton de Gruyter.
- Hengeveld, Kees & J. Lachlan Mackenzie. 2008. *Functional Discourse Grammar: A typologically-based theory of language structure*. Oxford: Oxford University Press.
- Hengeveld, Kees & J. Lachlan Mackenzie. 2016. Reflections on the lexicon in Functional Discourse Grammar. *Linguistics* 54(5). 1135–1161.
- Hengeveld, Kees & Mackenzie, J. Lachlan. this volume. Interfaces in Functional Discourse Grammar.
- Johns, Alana. 2009. Additional facts about noun incorporation (in Inuktitut). *Lingua* 119(2). 185–198.
- Johns, Alana. 2017. Noun incorporation. In Martin Everaert & Henk C. van Riemsdijk (eds.), *The Wiley Blackwell companion to syntax*, 2nd edn. Hoboken, NJ: John Wiley & Sons Inc.
- Johnson, Heidi A. 2000. *A grammar of San Miguel Chimalapa Zoque*. Austin, TX: University of Texas dissertation.
- Kristoffersen, Lars. 1992. Derivation and inflection in a functional grammar of West Greenlandic. In Michael Fortescue, Peter Harder & Lars Kristoffersen (eds.), *Layered structure and reference in a functional perspective: Papers from the Functional Grammar Conference in Copenhagen, 1990*, 143–171. Amsterdam & Philadelphia: John Benjamins.

- Lehmann, Christian & Elisabeth Verhoeven. 2005. Noun incorporation and participation: A typological study on participant association with particular reference to Yucatec Maya. In Christian Lehmann (ed.), *Typological studies in participation* (Studia Typologica 7), 105–188. Berlin: Akademie Verlag.
- Lemieux, Alice. 2010. Small but significant: Body part incorporation in Washo. In Beth Rogers & Anita Szakay (eds.), *Proceedings of the Fifteenth Workshop on Structure and Constituency in Languages of the Americas*, 159–156. Vancouver: University of British Columbia.
- Loncon Antileo, Elisa C. 2017. *El poder creativo de la lengua Mapudungun y la formación de neologismos*. Leiden: Leiden University dissertation.
- Malchukov, Andrej L. 2013. Alignment preferences in basic and derived ditransitives. In Dik Bakker & Martin Haspelmath (eds.), *Languages across boundaries: Studies in memory of Anna Siewierska*, 263–289. Berlin: De Gruyter.
- Malchukov, Andrej, Martin Haspelmath & Bernard Comrie. 2010. Ditransitive constructions: A typological overview. In Andrej Malchukov, Martin Haspelmath & Bernard Comrie (eds.), *Studies in ditransitive constructions: A comparative handbook*, 1–64. Berlin & New York: Mouton de Gruyter.
- Mardirussian, Galust. 1975. Noun-incorporation in Universal Grammar. In *Papers from the Regional Meeting of the Chicago Linguistic Society* 11. 383–389.
- Massam, Diane. 2001. Pseudo noun incorporation in Niuean. *Natural Language & Linguistic Theory* 19(1). 153–197.
- Massam, Diane. 2009. Noun incorporation: Essentials and extensions. *Language and Linguistics Compass* 3(4). 1076–1096.
- Massam, Diane. 2017. Incorporation and pseudo-incorporation in syntax. In *Oxford research encyclopedia of linguistics* (Oxford Research Encyclopedias). Oxford: Oxford University Press. <https://doi.org/10.1093/acrefore/9780199384655.013.190> (accessed on 28 March, 2019).
- Mattissen, Johanna. 2003. *Dependent-head synthesis in Nivkh: A contribution to a typology of polysynthesis* (Typological Studies in Language 57). Amsterdam: Benjamins.
- Mattissen, Johanna. 2017. Nivkh. In Michael Fortescue, Marianne Mithun & Nicholas Evans (eds.), *The Oxford handbook of polysynthesis* (Oxford Handbooks in Linguistics), 851–881. Oxford: Oxford University Press.
- Mithun, Marianne. 1984. The evolution of noun incorporation. *Language* 60(4). 847–894.
- Mithun, Marianne. 1986. The convergence of noun classification systems. In Colette Craig (ed.), *Noun classes and categorization: Proceedings of a symposium on categorization and noun classification, Eugene, Oregon, October 1983*, 379–397. Amsterdam & Philadelphia: John Benjamins.
- Mithun, Marianne. 2000. Incorporation. In Geert Booij, Christian Lehmann & Joachim Mugdan (eds.), *Morphologie: Ein internationales Handbuch zur Flexion und Wortbildung*, vol. 1 (Handbücher zur Sprach- und Kommunikationswissenschaft 17(1)), 916–928. Berlin: De Gruyter.
- Murasugi, Kumiko. 2014. Noun incorporation, nonconfigurationality, and polysynthesis. In Andrew Carnie, Yosuke Sato & Daniel Siddiqi (eds.), *The Routledge handbook of syntax* (Routledge Handbooks in Linguistics), 283–303. London: Routledge.
- Nakayama, Toshihide. 2014. Nuuchahnulth (Nootka). In Carol Genetti (ed.), *How languages work: An introduction to language and linguistics*, 441–462. Cambridge: Cambridge University Press.
- Olthof, Marieke. 2020a. Formal variation in incorporation: A typological study and a unified approach. *Linguistics* 58(1). 131–205.

- Olthof, Marieke. 2020b. Referentiality and modifiability of incorporated nouns: cross- and intra-linguistic variation. *Sprachtypologie und Universalienforschung* 73(3). 305–362.
- Payne, Doris L. & Immanuel Barshi. 1999. External possession: What, where, how and why. In Doris L. Payne & Immanuel Barshi (eds.), *External possession* (Typological Studies in Language 39), 3–29. Amsterdam & Philadelphia: John Benjamins.
- Payne, Thomas E. 1995. Object incorporation in Panare. *International Journal of American Linguistics* 61(3). 295–311.
- Payne, Thomas E. & Doris L. Payne. 2013. *A typological grammar of Panare: A Cariban language of Venezuela* (Brill's Studies in the Indigenous Languages of the Americas 5). Leiden: Brill.
- Rice, Keren. 2008. On incorporation in Athapaskan languages: Aspects of language change. In Thórhallur Eythórsson (ed.), *Grammatical change and linguistic theory: The Rosendal papers* (Linguistik Aktuell 113), 375–409. Amsterdam: Benjamins.
- Sadock, Jerrold M. 1980. Noun incorporation in Greenlandic: A case of syntactic word formation. *Language* 56(2). 300–319.
- Sadock, Jerrold M. 1985. Autolexical syntax: A proposal for the treatment of noun incorporation and similar phenomena. *Natural Language & Linguistic Theory* 3(4). 379–439.
- Sadock, Jerrold M. 2003. *A grammar of Kalaallisut (West Greenlandic Inuttut)* (Languages of the World/Materials 162). Munich: LINCOM.
- Sadock, Jerrold M. 2006. Incorporation. In Keith Brown (ed.), *Encyclopedia of language & linguistics*, 2nd edn., 584–587. Amsterdam: Elsevier.
- Seiter, William J. 1980. *Studies in Niuean syntax* (Outstanding Dissertations in Linguistics). New York, NY: Garland Publishing.
- Smit, Niels. 2005. Noun incorporation in Functional Discourse Grammar. In Casper de Groot & Kees Hengeveld (eds.), *Morphosyntactic expression in Functional Grammar* (Functional Grammar Series 27), 87–134. Berlin: Mouton de Gruyter.
- Smit, Niels. 2010. *FYI: Theory and typology of information packaging*. Amsterdam: University of Amsterdam dissertation.
- Spencer, Andrew. 1995. Incorporation in Chukchi. *Language* 71(3). 439–489.
- Stonham, John. 2008. Verb-argument composition in Nuuchahnulth: A special case of denominal verb formation. *International Journal of American Linguistics* 74(4). 511–528.
- Sullivan, Paul R. 1984. Noun incorporation in Yucatec Maya. *Anthropological Linguistics* 26(2). 138–160.
- Vajda, Edward. 2017. Polysynthesis in Ket. In Michael Fortescue, Marianne Mithun & Nicholas Evans (eds.), *The Oxford handbook of polysynthesis* (Oxford Handbooks in Linguistics), 906–929. Oxford: Oxford University Press.
- Velázquez-Castillo, Maura. 1995. Noun incorporation in Guaraní: A functional analysis. *Linguistics* 33(4). 673–709.
- Velázquez Castillo, Maura. 1996. *The grammar of possession: Inalienability, incorporation and possessor ascension in Guaraní* (Studies in Language Companion Series 33). Amsterdam: Benjamins.
- Visser, Eline, Eva van Lier & Marieke Olthof. 2019. The semantics and frequency of incorporating verbs in Kalamang. (Paper presented at the 11th International Austronesian and Papuan Languages and Linguistics Conference, Leiden, 13–15 June 2019.)
- Waldie, Ryan J. 2004. *Nuu-chah-nulth denominal verbs*. Victoria: University of Victoria dissertation.

- Weir, E. M. Helen. 1990. Incorporation in Nadëb. In Doris L. Payne (ed.), *Amazonian linguistics: Studies in Lowland South American languages* (Texas Linguistics Series), 321–363. Austin, TX: University of Texas Press.
- Zúñiga, Fernando. 2017. Mapudungun. In Michael Fortescue, Marianne Mithun & Nicholas Evans (eds.), *The Oxford handbook of polysynthesis* (Oxford Handbooks in Linguistics), 696–712. Oxford: Oxford University Press.