

A head-driven account of long-distance case assignment

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1.1 Introduction

In virtually every syntactic framework, case assignment is considered a local phenomenon. That is, while many languages with so-called ‘quirky case’ have verbs which assign dative case to their subject, it would be very surprising to find a verb which, say, assigned dative case to its subject’s specifier’s complement. Roughly speaking, a head assigns case under government. While frameworks may differ wildly in the technical elaboration of notions like ‘head’, ‘assigns case’, and ‘government’, the essential insight remains the same: case assignment is a local relationship between a head and a dependent.

While in, e.g., Government and Binding Theory (Chomsky, 1981), the local nature of case assignment is stipulated, one attraction of the Head-Driven Phrase Structure Grammar treatment of case is that the locality of case assignment can be made to follow as a corollary of more general locality principles. Pollard and Sag (1994) treat case assignment as a matter of lexical selection. That is to say, there is no case assignment operation per se. Instead, case is simply one of the properties of a dependent which a head can subcategorize for. Generalizations about case assignment, like any other subcategorization patterns, can be expressed as constraints on types in the lexical hierarchy. Under this view, the domain of case assignment follows as a consequence of the locality of subcategorization, which in turn follows from geometry of feature structures.

Unfortunately, Pollard and Sag’s (1994) original conception of case assignment, while simple and elegant, was not quite general enough to

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be applied to languages with more complex case systems than English. In particular, since it treated case assignment as a purely lexical matter, it was unable to provide an account of phenomena in which case is associated with a particular structural position rather than a particular lexical head. In order to account for structural case assignment, Pollard (1994) and Heinz and Matiasek (1994) shifted at least some case assignment from individual lexical entries to individual constructions. One side effect of this configurational theory of case assignment was that separating case assignment from lexical subcategorization eliminated the locality predictions of the Pollard and Sag's original analysis. Under the configurational view, case assignment was still local to the combination of a single head with its dependents, but only as a matter of convention. This locality did not follow from any more general principles.

In more recent work, Przepiórkowski (1999a,1999b) has reconciled these two positions, arguing that the appropriate locus of case assignment is a slightly enriched dependents list. Przepiórkowski takes from the configurational approach to case assignment the distinction between lexical and structural cases and the recognition that some information about the structural realization of a dependent is necessary to determine proper case assignment. However, since the domain of case assignment is a single head's dependents list, Przepiórkowski's analysis makes the same locality predictions as Pollard and Sag's purely lexical proposal.

To see how Przepiórkowski's analysis works, let us consider an example. In German, a finite verb like *hilft* '(he/she/it) helps' generally takes a nominative subject, unless the subject is realized as a complement of some higher verb in a raising construction. In this respect, it is like any other finite verb in German. Unlike most finite verbs, however, *hilft* assigns dative case rather than accusative case to its direct object. Therefore, *hilft* would have the following (partial) lexical specification:

$$(1) \left[\begin{array}{ll} \text{PHON} & \langle \textit{hilft} \rangle \\ \text{DEPS} & \langle \text{NP}[\textit{str}], \text{NP}[\textit{dat}] \rangle \end{array} \right]$$

This entry selects for the case assigned to the direct object but leaves the case of the subject specified only as *structural*, as the actual case assigned to the subject depends on its structural realization.

To account for the constructional nature of structural case assignment while still preserving the locality of case assignment, Przepiórkowski introduces the feature RAISED into the dependents list, which identifies those dependents which are realized locally and those that are realized non-locally via some kind of raising construction. This introduces just enough structural information into DEPS to allow structural case to be

determined by the non-configurational Case Principle, given in (2).¹

(2) CASE PRINCIPLE (Przepiórkowski, 1999a)

$$\begin{array}{l}
 \text{a. } \left[\begin{array}{l} \text{HEAD } \textit{verb} \\ \text{DEPS } \left\langle \left[\begin{array}{ll} \text{ARG} & \text{NP}[\textit{str}] \\ \text{RAISED} & - \end{array} \right] \right\rangle \oplus \boxed{1} \end{array} \right] \rightarrow \\
 \left[\text{DEPS } \langle \text{NP}[\textit{snom}] \rangle \oplus \boxed{1} \right] \\
 \\
 \text{b. } \left[\begin{array}{l} \text{HEAD } \textit{verb} \\ \text{DEPS } \boxed{2} \textit{nelist} \oplus \left\langle \left[\begin{array}{ll} \text{ARG} & \text{NP}[\textit{str}] \\ \text{RAISED} & - \end{array} \right] \right\rangle \oplus \boxed{1} \end{array} \right] \rightarrow \\
 \left[\text{DEPS } \boxed{2} \textit{nelist} \oplus \langle \text{NP}[\textit{sacc}] \rangle \oplus \boxed{1} \right]
 \end{array}$$

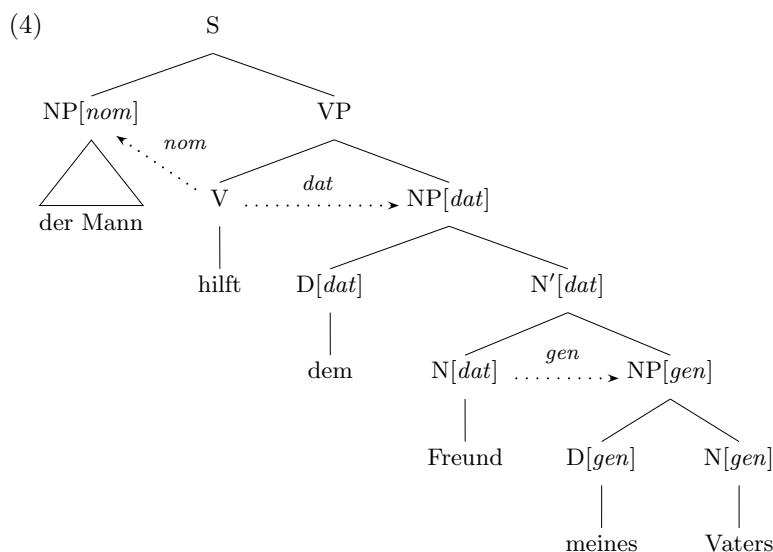
These constraints ensure that a non-raised dependent which is lexically assigned a structural case receives nominative case if it is the subject, otherwise is receives accusative case.

Przepiórkowski's Case Principle is non-lexical, in the sense that it depends on constructional information which not available in any single lexical entry. However, the domain of the constraints in (2) is the DEPS list of a lexical head. Therefore, (2) preserves the strong locality predictions made by the earlier purely lexical treatment of case assignment. In particular, it predicts that a head cannot assign case at a distance, selecting for a dependent which itself has a dependent in a particular case, as no single DEPS list includes both dependents and dependents of dependents. In this instance, *hilft* requires a dative object, but as we see in (3b), dependents of dependents are not assigned dative case by the verb:

- (3) a. Der Mann hilft mir.
 The man.NOM helps me.DAT
 'The man is helping me.'
- b. Der Mann hilft dem Freund meines Vaters.
 The man.NOM helps the friend.DAT my father.GEN
 'The man is helping my father's friend.'

¹In this paper I will be assuming Bouma et al.'s (2001) version of Argument Structure Extension and so the Case Principle must make reference to the DEPS list. Since Przepiórkowski (1999a) assumes a slightly different formulation of Argument Structure Extension, he states this as a constraint on ARG-ST, not DEPS.

Rather, *meines Vaters*, a dependent of *Freund*, is assigned genitive case locally by *Freund*, as in (4).



The dative determiner *dem* shows concord with the head noun, but does not receive case directly from the main verb.

1.2 A Problem

Przeiórkowski's Case Principle can account for structural case marking while still making the same strong locality predictions as Pollard and Sag (1994). Unfortunately, however, a few languages do seem to exhibit exactly the kind of long-distance case marking that is predicted not to occur under this analysis. This phenomenon can be found throughout the languages of the world, though it is particularly well attested in the languages of Australia (Dench and Evans, 1988; Blake, 1994; Plank, 1995). For instance, consider this Gumbaynggir sentence:

- (5) Ba:ba-gu gunuy-gundi-yu ju:ngu jala:ny jamay
 father-ERG child-GEN-ERG say.FUT tongue-NOM too
 barway.
 big-NOM.
 'The child's father will say "(Your) mouth is too big".'
 (Eades, 1979, 277)

The possessor *gunuygundi-yu* 'child' is locally assigned genitive case by the noun *ba:bagu* 'father', and is also assigned ergative case by the verb

ju:ngu ‘say’. Since the possessor is not directly a dependent of the verb, it is surprising to see ergative case marking on the embedded constituent. In Gumbaynggir, multiple case marking is largely restricted to combinations of genitive case with grammatical cases like the ergative, but in other languages we also find the same kind of multiple case marking on possessors in NPs bearing a ‘semantic’ case which functions like a PP would in an English sentence. For example, consider this example from Kayardild:

- (6) dan-karra-nguni maku-karra-nguni mirra-nguni mijil-nguni
 this-GEN-INSTR woman-GEN-INSTR good-INSTR net-INSTR
 ‘...with this woman’s good net’ (Evans, 1995a, 119)

The NP as a whole functions as an adverbial and is marked with the instrumental case. The subconstituent *dankarranguni makukarranguni* ‘this woman’ is also assigned genitive case by the head noun *mijilnguni* ‘net’, so its components bear both genitive and instrumental case endings.

In many languages that show classical ‘suffixaufnahme’, this kind of multiple case marking is limited to genitive NPs. However, in a few, long distance case marking can be extended even further, as in these Martuthunira examples:

- (7) Ngayu nhuwa-lalha tharnta-a kupuyu-marta-a
 1SG.NOM spear-PAST euro-ACC little-PROP-ACC
 thara-ngka-marta-a.
 pouch-LOC-PROP-ACC
 ‘I speared a euro with a little one in its pouch.’
 (Dench and Evans, 1988, 7)
- (8) Ngunhu wartirra puni-lha ngurnu-ngara-mulyarra
 the woman go-PAST that-PL-ALL
 kanyara-ngara-mulyarra kapunmarnu-marta-ngara-mulyarra
 man-PL-ALL shirt-PROP-PL-ALL
 jirli-wirra-marta-ngara-mulyarra.
 arm-PRIV-PROP-PL-ALL
 ‘That woman went towards those men with shirts without sleeves.’
 (Andrews, 1996, 19)

In (7) each word in the object NP is marked with accusative case in agreement with the head noun *tharntaa* ‘euro (a kind of kangaroo)’. In addition to receiving accusative case, the modifier *kupuyumartaa* ‘little (one)’ is marked with the propriative case, indicating the relationship

between it and the head noun. *Tharangkamartaa* ‘pouch’ carries three case markers: accusative case in concord with *tharntaa*, propriative case in concord with *kupuyumartaa*, and locative case indicating its role as a modifier. With effort, this can be carried even further: in the elicited example (8), *jirliwirramartangaramulyarra* ‘arm’ has four case markers!²

While this kind of case stacking has received some attention in the Lexical-Functional Grammar literature (Simpson, 1991; Andrews, 1996; Nordlinger, 1998b), it has not yet received an adequate treatment in other frameworks. In the remainder of this paper, I will show how the HPSG theory of case assignment can be extended to account for this kind of case marking.

1.3 A Solution

The most straightforward way to model case stacking in HPSG is to generalize the value of the CASE feature to be a list of morphosyntactic cases.³ This allows us to preserve the generalization that case is assigned locally via the argument structure of a lexical head, and that the case of the head of a phrase determines the case of the phrase as a whole. What case stacking in languages like Gumbaynggir shows is that a concord constraint also propagates the case of the head onto all of its dependents, even those that locally receive a different case. If we adopt the position that at least some adjuncts appear on the DEPS list of the head they modify (see, e.g., van Noord and Bouma 1994; Bouma et al. 2001), then this Case Concord Principle, like the Case Principle itself, can be formalized as a constraint on DEPS:

$$(9) \text{ CASE CONCORD PRINCIPLE}$$

$$\left[\begin{array}{l} \text{HEAD} \mid \text{CASE} \quad \boxed{0} \\ \text{DEPS} \quad \boxed{2} \oplus \left\langle \left[\text{ARG} \quad \text{NP} \left[\text{L-CASE} \quad \boxed{1} \textit{list}(\textit{case}) \right] \right] \right\rangle \oplus \boxed{3} \end{array} \right] \rightarrow$$

$$\left[\text{DEPS} \quad \boxed{2} \oplus \left\langle \left[\text{ARG} \quad \text{NP} \left[\text{CASE} \quad \boxed{1} \oplus \boxed{0} \right] \right] \right\rangle \oplus \boxed{3} \right]$$

This constraint ensures that the CASE value of each dependent will consist minimally of the CASE value of the head which selects for it, with the addition of any locally assigned case at the head of the list. When the argument is a nominal modifier or demonstrative, such as *dankar-*

²The plural suffix *ngara* operates much like a semantic case marker in Martuthunira; see Andrews 1996.

³Tseng (1999) makes essentially the same suggestion.

ranguni ‘this’ in (6), the L-CASE value is empty and the CASE value is identical to that of the selecting head. When the dependent is itself an NP, it will be assigned a grammatical or semantic case, and the CASE value of the dependent will be that assigned case plus the CASE value of the head.

Finally, in addition to the constraint in (9) and a language-particular Case Principle similar to (2), there must be a constraint on words which relates the value of CASE to the morphological form of the word:

(10) CASE REALIZATION PRINCIPLE

$$word \rightarrow \left[\begin{array}{ll} \text{PHON} & f_c(\mathbb{1}, \mathbb{2}) \\ \text{STEM} & \mathbb{1} \\ \text{HEAD|CASE} & \mathbb{2} \end{array} \right]$$

The function f_c maps the morphosyntactic cases in CASE into their morphophonological realization. The order of affixes generally reflects the order of cases in the CASE value, but the order is sometimes determined by purely morphological factors, as in this Kayardild example:

- (11) Ngada balmbi-wu kurri-ju kilwan [barraki-n-ku
 I.NOM morrow-MOD watch-FUT them-MOD chop.NOM-MOD
 kurda-wuu-nth].
 coolamon-MOD-OBL
 ‘Tomorrow I will watch them chopping (making) a coolamon.’
 (Evans, 1995b, 412)

Here the verb *kurriju* ‘watch’ assigns a modal case to each of its non-subject dependents. On *kurdawuunth* ‘coolamon’, this modal case marking precedes the oblique case marking assigned by the nominalized verb *barrakinku* ‘chopping’, even though the oblique case precedes the modal case on the noun’s CASE list.

These constraints taken together provide a completely general head-driven account of case stacking and long distance case assignment. To see how they work, consider again the example in (5). If we assume that ergative and genitive are both lexical cases in Gumbaynggir, *ju:ngu* ‘say’ and the noun *ba:ba* ‘father’ would have the following lexical entries:

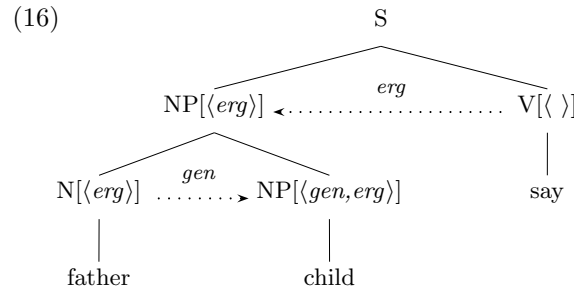
(12) $\left[\begin{array}{ll} \text{STEM} & \langle ju:ngu \rangle \\ \text{DEPS} & \langle \text{NP[L-CASE } \langle erg \rangle], \text{CP} \rangle \end{array} \right]$

(13) $\left[\begin{array}{ll} \text{STEM} & \langle ba:ba \rangle \\ \text{DEPS} & \langle \text{NP[L-CASE } \langle gen \rangle] \rangle \end{array} \right]$

When combined with the principle in (9), this yields the partial lexical descriptions in (14) and (15), respectively.

- (14)
$$\left[\begin{array}{ll} \text{STEM} & \langle ju:ngu \rangle \\ \text{HEAD | CASE} & \boxed{1} \\ \text{DEPS} & \langle \text{NP}[\langle erg \rangle \oplus \boxed{1}], \text{CP} \rangle \end{array} \right]$$
- (15)
$$\left[\begin{array}{ll} \text{STEM} & \langle ba:ba \rangle \\ \text{HEAD | CASE} & \boxed{2} \\ \text{DEPS} & \langle \text{NP}[\langle gen \rangle \oplus \boxed{2}] \rangle \end{array} \right]$$

When combined to construct the sentence in (5), these lexical descriptions combine to yield the structure in (16).



If we follow Bouma et al. (2001) in allowing a head's DEPS list to be extended to include adjuncts as well as arguments, the Case Concord Principle and the Case Realization Principle also provide a natural account of case stacking with semantic cases, as in (7). To see how this would work, we first need to consider a modification of Argument Structure Extension. As originally formulated in (17), this constraint states that the DEPS list is the ARG-ST plus zero or more adjuncts:

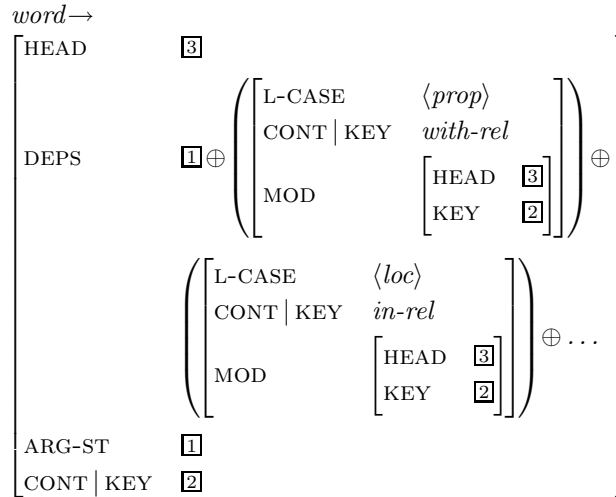
- (17) ARGUMENT STRUCTURE EXTENSION:
- $$verb \rightarrow \left[\begin{array}{ll} \text{HEAD} & \boxed{3} \\ \text{DEPS} & \boxed{1} \oplus list \left(\left(\left[\text{MOD} \begin{array}{ll} \text{HEAD} & \boxed{3} \\ \text{KEY} & \boxed{2} \end{array} \right] \right) \right) \\ \text{ARG-ST} & \boxed{1} \\ \text{CONT | KEY} & \boxed{2} \end{array} \right]$$

Each adjunct is constrained to modify the semantic content of the head, but nothing is said about the particular relation introduced by the adverbial phrases. In English, the content of the modifier is introduced in

the lexical entry of the preposition or adverb that heads the modifier, so there is no need for Argument Structure Extension to say anything about the content of the modifier. In some languages with semantic case, like Polish and Korean, semantic cases behave very much like morphologically bound prepositions, so the content of the adverbial can be determined by the semantic case ending in the same manner as a preposition (see, e.g., Bratt 1996; Tseng 1999).

In the languages under consideration here, however, dependents agree with the head that selects for them in both grammatical and semantic case. That means that the adverbial relation cannot be associated with the semantic case ending itself. Otherwise, in an example like (6), the *with* relation would be introduced not only on the head of the phrase as a whole, but also on each of the words in the phrase that bears instrumental case marking. We could assume that these case markers are systematically ambiguous between a semantic case that introduces an adverbial meaning and a grammatical case that merely shows concord (following Simpson 1991), or that there is some other mechanism for disregarding the adverbial relation introduced by concord uses of semantic case markers (as does Andrews 1996). However, a solution closer to the spirit of Bouma et al.’s (2001) approach to adjunction is to associate the adverbial meaning of the semantic case not with the case ending itself, but with the constraint that licenses the appearance of the adjunct:

(18) ARGUMENT STRUCTURE EXTENSION (MARTUTHUNIRA):



Rather than allowing adjuncts to be freely added to the DEPS list, this language-specific variant of Argument Structure Extension licenses the

optional addition of specific kinds of adverbials. One possibility is to add an adjunct which bears propriative case and has the appropriate semantics, another is to add an adjunct which bears locative case and has the appropriate semantics, and so on.

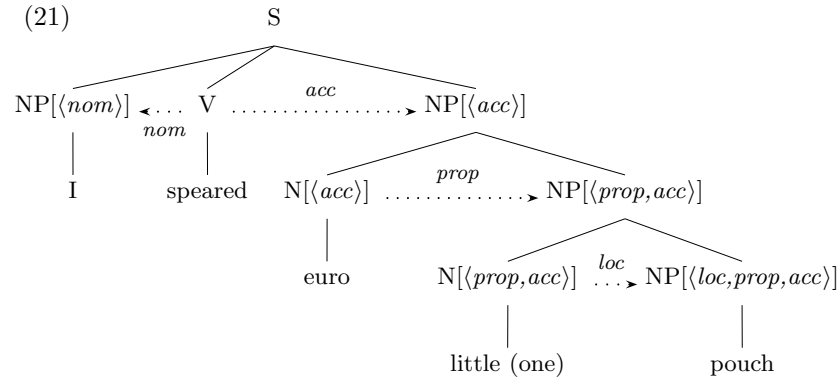
This constraint will apply to the lexical entry for the noun stem *tharnt-* ‘euro’ to produce the partial lexical specification:

$$(19) \left[\begin{array}{l} \text{STEM} \quad \langle \textit{tharnt} \rangle \\ \text{HEAD} \quad \left[\begin{array}{l} \textit{noun} \\ \text{CASE} \quad \mathbb{1} \end{array} \right] \\ \text{DEPS} \quad \mathbb{2} \oplus \langle \text{NP}[\langle \textit{prop} \rangle \oplus \mathbb{1}] \rangle \\ \text{ARG-ST} \quad \mathbb{2} \langle \rangle \end{array} \right]$$

Similarly, this constraint will license a version of the lexical entry for *kupuyu-* ‘little’ which selects for a locative modifier. Finally, the lexical entry for the verb *nhuwalalha* ‘spear’ includes the constraint:

$$(20) \left[\begin{array}{l} \text{PHON} \quad \langle \textit{nhuwalalha} \rangle \\ \text{HEAD} \quad \left[\begin{array}{l} \textit{verb} \\ \text{CASE} \quad \mathbb{1} \langle \rangle \end{array} \right] \\ \text{DEPS} \quad \mathbb{2} \oplus \langle \rangle \\ \text{ARG-ST} \quad \mathbb{2} \langle \text{NP}[\langle \textit{nom} \rangle \oplus \mathbb{1}], \text{NP}[\langle \textit{acc} \rangle \oplus \mathbb{1}] \rangle \end{array} \right]$$

When combined, these lexical specifications will yield the structure in (21).⁴



The verb selects for a nominative subject and an accusative object. The head of the object selects for an NP whose CASE value is a list con-

⁴Here I follow Dench (1995) on the structure of the Martuthunira noun phrase.

taining an adnominal case (propriative) and the case value of the head (accusative). The head of that modifier NP itself selects for a modifier NP whose CASE value consists of an adnominal case (in this case, locative) and the case value of the head (propriative and accusative).

1.4 Consequences and conclusions

This head-driven account of case concord can also be applied straightforwardly to other types of case agreement. For example, the oblique case or the locative case can be used to mark finite complement clauses in Kayardild:⁵

- (22) a. Ngada murmurdawa-th ngijin-inja thabuju-ntha
 1SG.NOM be.glad-ACT my-OBL brother-OBL
 thaa-thuu-nth.
 return-POT-OBL
 ‘I am glad that my brother is coming back.’
 (Evans, 1995a, 490)
- b. Dan-kurrka ri-in-kurrka thardawankawuru-ntha
 here-LOC.OBL east-FROM-LOC.OBL airplane-OBL
 burri-jurrk.
 emerge-IMMED.OBL
 ‘(I can hear) the airplane is coming in, here from the east now.’
 (Evans, 1995a, 525)

As (22) shows, the oblique can also be used with ‘insubordinated’ main clauses, which presumably involve (at least diachronically) elision of an epistemic main clause. Since under this proposal verbs carry a (usually empty) CASE value, the behavior of ‘complementizing case’ is predicted. Modal case and associating case in Kayardild could be given an analogous treatment (see Nordlinger 1998a, 1998b for more discussion of this and related phenomena).

The analysis presented here also has the potential to shed some light on a number of ‘case attraction’ phenomena, in which a constituent bears the case of a larger constituent of which it is a part rather than its locally assigned case. For example, in Classical Armenian, a possessor can sometimes bear the case of the head of which it is a dependent rather than the expected genitive:

- (23) i knoĵ-ê t’agawor-i-n
 by wife-ABL.SG king-GEN.SG-DEF

⁵In (22), *-kurrka* is a portmanteau realization of the locative and the oblique case endings.

‘by the wife of the king’ (Plank, 1995, 20)

- (24) i knoĵ-ê t’agawor-ē-n
by wife-ABL.SG king-ABL.SG-DEF

‘by the wife of the king’ (Plank, 1995, 20)

Suppose that case concord in Classical Armenian obeys the Case Concord Principle in (9). Then the value of CASE on *t’agawor-* ‘king’ will be ⟨*gen, abl*⟩. While the morphological resources of Armenian do not allow multiple case suffixes on a single word, the Case Realization Principle in (10) will potentially allow either case to surface.

Another kind of case attraction is found in relative clauses, in which the relative word shows either the internal case assigned to it inside the relative clause or the external case assigned to the relative clause construction as a whole. Often, as in these Gothic examples, the choice of which case is realized depends on the relative obliqueness of the cases involved:

- (25) ip [þamm-ei leitul fraletada] leitul friod
but whom-DAT little is.forgiven little loves
‘But (the one) whom little is forgiven loves little

(Harbert, 1992, 111)

- (26) [þo-ei ist us Laudeikaiou] jus ussggwaid
which.ACC-COMP is from Laodicea you read
‘And read (the one) which is from Laodicea’

(Harbert, 1992, 111)

In (25), the relative pronoun receives dative case inside the relative clause and nominal case from the main clause. Since dative is more oblique than nominative, the relative pronoun appears in the dative form. On the other hand, in (26), the internal case of the relative pronoun, nominative, is less oblique than its external case, accusative, so the relative pronoun appears in the accusative form. This sort of interaction is exactly what we would expect if case attraction phenomena arise from the Case Realization Principle’s need to express multiple cases using limited morphological resources.

The analysis that I have outlined here contrasts with previous approaches in that it is completely head-driven. Andrews (1996) and Nordlinger (1998b) claim that adnominal case stacking can only be adequately accounted for using inside-out constraints. For example, the propriative affix *-marta* would be associated with a lexical entry along the lines of (27).

- (27) *-marta* (ADJ ↑)
 (↑ CASE) = LOC

This entry can be interpreted to mean that the f-structure of the word this affix is attached to contains the feature/value pair [CASE *loc*], and that the f-structure of that word is the value of the feature ADJ in some higher f-structure.

The approach described here on the other hand is able to account for case stacking without the addition of new formal mechanisms beyond those needed for case marking in other languages. Furthermore, since the inside-out approach to case stacking treats case marking as an essentially non-local phenomenon, additional constraints on the scope of a case marker's inside-out functional equations are required to capture the 'successive cyclic' nature of case stacking and to restrict the kinds of non-local case marking dependencies that can be introduced. In contrast, under the current analysis the scope of case marking is strictly controlled by independently motivated locality conditions. So, while it is possible to enrich the HPSG description language to include inside-out constraints (Koenig, 1999), it is not clear that it is either necessary or desirable to do so to handle case stacking.

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