Head-marking languages and linguistic theory

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In her path-breaking 1986 paper, Johanna Nichols proposed a typological contrast between head-marking and dependent-marking languages. Nichols argues that even though the syntactic relations between the head and its dependents are the same in both types of language, the syntactic "bond" between them is not the same; in dependent-marking languages it is one of government, whereas in head-marking languages it is one of apposition. This distinction raises an important question for linguistic theory: How can this contrast – government versus apposition – which can show up in all of the major phrasal types in a language, be captured? The purpose of this paper is to explore the various approaches that have been taken in an attempt to capture the difference between head-marked and dependent-marked syntax in different linguistic theories. The basic problem that head-marking languages pose for syntactic theory will be presented, and then generative approaches will be discussed. The analysis of head-marked structure in Role and Reference Grammar will be presented.

> I have argued that the theoretical apparatus of classical, traditional, structural and formal grammar is heavily based on dependent-marked syntax. If the hypothesis of the universally preferred nature of head-marked patterns holds true, then we will have to recognize that describing the world's languages in standard theoretical terms is not merely Eurocentric distortion, but in fact forces the unmarked grammatical structure into a framework devised for the marked type. Nichols (1986: 116)

1. Introduction[1]

In her path-breaking 1986 paper, Johanna Nichols proposed a typological contrast between head-marking and dependent-marking languages. Previous scholars as far back

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as the first part of the nineteenth century had observed that languages with extensive agreement on the verb, regardless of whether they had case marking on RPs[2] or not, seem to work differently from Indo-European languages, which have little or no agreement and often have case marking on RPs. This was first noted with respect to clause structure and the relationship between RP arguments and the verb, as illustrated in (1) and (2).

(1) a. *Die Lehrerin gab* *German*
the.NOM teacher give.PST
der Frau das Buch.
the.DAT woman the.ACC book[3]
'The teacher gave the book to the woman.'

b. **Gab.*
'[She] gave [it to her].'

(2) a. *Wičháša ki hená wówapi* *Lakhota*
man the those book
ki Ø-wičhá-wa-k'u.[4]
the INAN-3PL.ANIM.U-1SG.A-give
'I gave the book to those men.'

b. *Wičháwak'u.*
'I gave it to them.'

An important difference concerns the relationship of RP arguments to the verb: they are for the most part obligatory in dependent-marking languages, whereas they are for the most part optional in head-marking languages. In (1) from German, a dependent-marking language, it is not the case that all of the RP arguments can simply be omitted, as (1b) shows. In Lakhota, by contrast, all of the RP arguments of the verb can be

2. 'RP' stands for "reference phrase," which is the category of referring expressions, which that are typically headed by nominals, hence the traditional label NP. See Van Valin (2008a) for detailed discussion.

3. Glosses follow the Leipzig Glossing Rules, with the following additional abbreviations and glosses: ANIM 'animate', CL 'clitic', DM 'dependent-marking', ECS 'extra-core slot', FRM 'formative', HM 'head-marking', IF 'illocutionary force', INAN 'inanimate', LDP 'left-detached position', LSC 'layered structure of the clause', NMR 'non-macrorole', PoCS 'post-core slot', PrCS 'pre-core slot', PRO 'pronoun', RDP 'right-detached position', and U "undergoer."

4. Lakhota is a split-intransitive language, and therefore the bound markers on the verb indicate actor versus undergoer, not subject versus object. "Subject" in Lakhota is [S, A]: that is, the single argument of an intransitive verb, regardless of whether it is actor or undergoer, and the actor of a transitive verb. The 'Ø' glossed INAN indicates that transitive verbs entail a specific undergoer argument, even though inanimate undergoers are not explicitly indicated morphologically on transitive verbs.

omitted, and the result is a fully grammatical sentence, as (2b) shows. Immediate recoverability from context is not a condition on the appropriateness or grammaticality of (2b). Various linguists – including Humboldt (1836), Boas (1911), and Van Valin (1977), among others – have suggested that this contrast is indicative of two different ways that RPs can be related to the verb, but no conclusions regarding differences in the grammar as a whole between the two types of language were drawn until Nichols addressed the issue. She showed that this distinction in clausal syntax is part of a larger, systematic contrast between two ways of indicating the syntactic relation between a head and its dependent(s): the marker of the relationship can occur on the dependent – that is, dependent marking – or it can occur on the head, i.e. head marking.[5]

In discussing examples analogous to (1) and (2) from Chechen (dependent marking) and Abkhaz (head marking), Nichols argues that even though the syntactic relations between the head and its dependents are the same in both languages – in this case, subject, direct object, and indirect object – the syntactic "bond" between them is not the same (1986: 108). She maintains that while all of the RPs in (1a) and (2a) are subcategorized for by the verb, those in (1a) are also governed by the verb, as indicated by the case assigned to them, but those in (2a) are not; rather, they are related through the "looser link of apposition, specification or the like"(1986: 108) between, in the case of (2a), *wičhaša ki hená* 'those men' and the prefix *wičha-* 'them' on the verb. The RPs in (2a) are optional, as the (2b) example shows.

This distinction raises an important question for linguistic theory: How can this contrast – government versus apposition – which can show up in all of the major phrasal types in a language, be captured? The answer is not obvious, for the following reason:

> It turns out that many fundamental analytic notions of formal and theoretical syntax are designed for dependent-marked relations; some of them even seem to be based on an implicit assumption that grammatical relations are normally dependent-marked. (Nichols 1986: 114–115)

The kind of standard constituent-structure analysis provided by many formal theories is designed to represent government relations of the kind found in (1a) but not the appositional relations found in (2a). The purpose of this paper is to explore some of the various approaches that have been taken, in an attempt to capture the difference between head-marked and dependent-marked syntax in different linguistic theories. In Section 2, the basic problem that head-marking languages pose for syntactic theory will be presented, and then, in Section 3, generative approaches will be discussed.

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5. It should be noted that there are two other types as well: languages that mark both the head and dependent, which are called "double-marking" languages, and languages that lack inflectional morphology and mark neither the head nor dependent in these constructions.

In Section 4, the analysis of head-marked structure in Role and Reference Grammar (RRG) (Van Valin 2005) will be presented. RRG is rather different from generative theories in a number of ways, and it is unusual among linguistic theories in that the consideration of head-marked phenomena informed the development of the theory right from its inception. Section 5 presents the outline of an RRG approach to morphology and discusses the morphological representation of "sentential words" as in (2b). Conclusions will be presented in the final section.

Two initial points need to be made. First, it is possible simply to deny that the contrast between head-marking and dependent-marking is real or substantive and to analyze head-marking languages as just dependent-marking languages with lots of agreement and phonologically null case and pronominals. In this view, (1a) and (2a) would have the same structure, ignoring word-order differences, with the case assigned to the RPs in (2a) being phonologically null. Crucially, (2b) would have the same structure as (2a), with the overt RPs replaced by phonologically null pronouns. Such an analysis was proposed for Lakhota in Williamson (1984), for example.[6] This discussion will not concern itself with this type of approach; rather, it will focus on approaches that recognize the distinction and try to accommodate it theoretically. Second, the analysis of head-marking languages in the generative literature has been entwined with the discussions of nonconfigurationality, on the one hand, and polysynthesis (Baker 1996), on the other. Although there are nonconfigurational languages that are head-marking, there are also purely dependent-marking nonconfigurational languages – for example, Dyirbal (Dixon 1972) and Jiwarli (Austin & Bresnan 1996) – and there are head-marking languages that lack most or all of the traits of nonconfigurational languages. While all polysynthetic languages seem to be head (or double) marking, there are head-marking languages that are clearly not polysynthetic. Mayan languages such as Jakaltek (Craig 1977), for example, are consistently head marking; however, they have relatively rigid syntax, lack most of the salient properties of nonconfigurational languages, and are not polysynthetic. Hence the focus in this discussion will be on head-marked morphosyntax, independent of issues of nonconfigurationality or polysynthesis.

2. Some challenges posed by head-marked syntax

As argued in Van Valin (1977, 1985, 1987), a key feature of the syntax of head-marking languages is that syntactic operations (or constructions, depending upon one's theoretical perspective) target the syntactic features realized by the bound argument markers

6. See Van Valin (1985, 1987) for detailed critiques of this type of approach.

on the verb or auxiliary; whether there are any independent RPs is irrelevant. This can be illustrated with the Lakhota obligatory control constructions in (3) and (4).

(3) a. *Wówapi ki ma-Ø-nú i-bl-úthe.*
book the stem-INAN-steal stem-1SG.A-try[7]
'I tried to steal the book.'

b. *Ma-Ø-nú i-bl-úthe.*
stem-INAN-steal stem-1SG.A-try
'I tried to steal it.'

c. *(*Wówapi ki*) *ma-Ø-**wá**-nu i-bl-úthe.*
book the stem-INAN-**1SG.A**-steal stem-1SG.A-try
Intended: 'I tried to steal the book.'

(4) a. *Hokšíla ki hená wówapi*
boy the those book
ki ma-Ø-nú-wičha-wa-ši
the stem-INAN-steal-3PL.ANIM.U-1SG.A-tell
'I told those boys to steal the book.'

b. *Wówapi ki ma-Ø-nú-wičha-wa-ši.*
Book the stem-INAN-steal-3PL.ANIM.U-1SG.A-tell
'I told them to steal the book.'

c. *Ma-Ø-nú-wičha-wa-ši.*
stem-INAN-steal-3PL.ANIM.U-1SG.A-tell
'I told them to steal it.'

d. *(*Hokšíla ki hená*) *wówapi ki*
Boy the those book the
*ma-Ø-**Ø**-nú-**pi**-wičha-wa-ši.*
stem-INAN-**3A**-steal-**PL**-3PL.ANIM.U-1SG.A-tell
Intended: 'I told those boys to steal the book.'

The construction in (3) is obligatory subject control with *iyútha* 'try'. There are no independent pronouns in (3a) and (3c); what is crucial, as the ungrammaticality of (3c) shows, is that the 1sg actor affix must be omitted on the linked verb. (The relevant affix and its gloss are in boldface.) This is even clearer in (4), an object-control construction. In (4a) the undergoer of *-ši* 'tell', which is also the understood actor of *manú* 'steal', is indicated twice, once by the independent RP *hokšíla ki hená* 'those boys' and once by the bound argument marker *-wičha-* 'them' prefixed to *-ši*; the RPs in

7. Many Lakhota verbs take their actor and undergoer affixes as infixes; this is true of both *iyútha* 'try' and *manú* 'steal' in these examples. The part of the stem before the infix will be glossed 'stem'.

(4a) can be omitted, as (4b) and (4c) illustrate. Just as in (3), the crucial feature of the construction is the lack of actor marking on the linked verb. The ungrammaticality of (4d) is caused by the overt third-person plural subject marking on the linked verb *manú* 'steal' ('3PLA' is signaled by the combination of zero marking plus the suffix *-pi*). Whether the independent RP *hokšíla ki hená* 'those boys' occurs or not is irrelevant to the grammaticality of the sentence. This is in striking contrast to the English translations of these two sentences, in which it is the independent RP that must be omitted in the construction. Thus, in the syntax of head-marking languages, the instantiations of arguments that are relevant for constructions such as these are the bound argument markers, not independent RPs. The challenge that these languages pose for linguistic theory, then, is how to devise an analysis of these phenomena that works for both types of languages. More specifically, given the definitions of argument positions that theories have, how can argument positions be occupied by bound forms in languages such as Lakhota but independent RPs in languages such as German? Moreover, what is the status of independent RPs in head-marking languages?

These examples also raise an important issue for morphological theory. How is it that the syntax can apparently target elements inside a word? Is this a violation of the principle of lexical integrity? If a single phonological word can function as a clause, what is the relationship between the internal structure of the word and the internal structure of the clause it instantiates?

3. Generative approaches

The primary approach to these problems that has been taken within generative frameworks is the pronominal argument hypothesis, first proposed in Jelinek (1984). In Jelinek's analysis, developed in a Government and Binding (GB) framework, the agreement markers on the verb or auxiliary occupy argument positions in the phrase-structure tree, with the verb+auxiliary+markers constituting the S/IP; independent RPs are adjuncts outside of this core structure in what are in effect dislocated positions. Under this analysis, a more accurate translation of (2) would be 'Those men, the book, I gave it to them' (cf. Jelinek 1984: 50). The pronominal argument hypothesis has received widespread acceptance in the generative literature and has been adapted into Minimalism.[8] Pensalfini (2004) proposes a version of the pronominal argument

8. LFG rejects it, proposing instead an analysis of the person-number inflections on the verb as being agreement in (2a) but as licensing a full f-structure and null pronominal in (2b) (Bresnan 2000). So from an LFG perspective, the person-number inflections never directly count as an argument.

hypothesis grounded in a principle of Distributed Morphology to the effect that "open class words are composed of at least two component morphemes, an encyclopedic component and a purely formal component" (2004: 360–361). In Pensalfini's model, the formal component of an argument, its phi features, occurs in an argument position in the core clause, which

> consists of that part of the phrase marker dominated by the maximal projection of the highest functional element. … This projection dominates all core argument positions as well as that of the syntactic predicate-head (prototypically V).
>
> (2004: 381)

The elements instantiating the encyclopedic component occur in positions outside the core clause, just as in the Jelinek version.

There are two immediate problems. First, detached elements are set off by intonation breaks, and there are normally no intonation breaks after the RPs in (2a). It is possible to set an RP off with an intonation break at the beginning of a sentence, in a typical left-dislocation construction, but this is not the case in (2a). Second, and more significant, if independent RPs are in dislocated positions, then this predicts that they should not appear in embedded clauses, since left- and right-dislocated elements do not occur in embedded clauses. Yet independent RPs are perfectly fine in embedded clauses in Lakhota, as (5a) and (5b) show.

(5) a. [*Hokšíla ki hená wówapi ki manú-wičha-wa-ši*
boy the those book the steal-them-I-tell
ki] *slol-Ø-yá-ye*.
COMP stem-INAN-2SG.A-know
'You know that I told those boys to steal the book.'

b. [*Hokšíla ki hená wówapi wą manú-wičha-wa-ši*
boy the those book a steal-them-I-tell
ki hé] *líla wakhą́*.
the that very sacred.
'The book that I told those boys to steal is very sacred.'

The construction in (5a) is an object complement, while (5b) is a head-internal restrictive relative clause; in both, independent RPs are fully grammatical, which strongly argues that they are not in detached, dislocated positions but rather are fully integrated into the clause. There are further, technical difficulties with this analysis in terms of GB theory (Van Valin 1987), which need not concern us here. Thus, while the various versions of the pronominal argument hypothesis treat the agreement markers as the true syntactic arguments, capturing a central feature of head-marking clausal syntax, the status of the independent RPs, remains problematic.

4. The Role and Reference Grammar approach

The founding question of RRG was, What would linguistic theory look like if it started from the analysis of languages like Tagalog, Dyirbal and Lakhota, rather than from the analysis of English? Thus, right from the start, the syntax of Lakhota and therefore of head-marking languages figured prominently in the development of RRG. Van Valin (1977) grappled with expressing the intuition that in Lakhota, RPs agreed with the verb; that is, they occurred in slots set up by the morphological marking on the verb, rather than the verb agreeing with one or more RPs accompanying it, as in English.[9] The breakthrough in the analysis of Lakhota came with Nichols (1983), an early version of Nichols (1986); this intuition was now clearly expressed in her head-marking versus dependent-marking opposition, and the result was the analysis of Lakhota presented in Van Valin (1985). In that article, it was argued that the bound markers on the verb are the true core arguments, but the status of the independent RPs was not adequately resolved. The theory at that point, based on Foley & Van Valin (1984), had only a very basic version of the layered structure of the clause (LSC), which had not been adequately formalized. If the independent RPs are not in core argument positions, then the only option for them was to be in the periphery with adjuncts. This is problematic for a number of reasons. First, true adjuncts in Lakhota may be adpositionally marked and are not cross-referenced on the verb.[10] Hence the independent RPs that can be interpreted as arguments by virtue of verbal cross-reference are qualitatively different and are not adjuncts. Second, the periphery in RRG is defined as containing elements that are not related to the logical structure of the predicate in the nucleus, the one exception being the constructionally specified demotion of a core argument such as the actor in a passive construction, and, consequently, cross-referenced RPs are incompatible with the periphery by definition.

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9. Van Valin (1978) proposed a typological contrast between noun-oriented (e.g. English) and verb-oriented (e.g. Lakhota) grammatical systems. It was never published. There is a possible historical connection between the early RRG analysis and the later pronominal argument hypothesis. In the spring semester of 1978, I gave a seminar based on Van Valin (1977, 1978) at the University of Arizona, and Eloise Jelinek, then a graduate student, was a participant in the seminar.

10. The term "adjunct" is used in two senses in the literature: non-argument, which is the sense used in RRG, and element adjoined to another, which is the sense used by Jelinek & Pensalfini. Since phrasal adjunction can be to any maximal projection, the question arises as to which node(s) the adjoined RPs are attached. The claim that they are in detached or dislocated positions suggests that they are CP adjuncts, given that they have different properties from WH-moved XPs in the specifier of CP. Binding facts support this conclusion; see below.

The formalization of the LSC came in Johnson (1987), and the expansion of the LSC to include core-external positions (pre-core slot, left- and right-detached positions) was developed in Van Valin (1993).[11] Given the availability of these extra-core syntactic positions, the question arose as to whether the independent RPs in sentences such as that in (2a) occupy one of them. The most obvious candidate would be the left-detached position (LDP), the position for left-dislocated elements; it is possible to have more than one LDP in a sentence, as in Japanese. However, two objections to this analysis have already been given in Section 2, and one more may be added here. WH expressions cannot occur in the LDP, as (6) illustrates.

(6) a. *As for which boy, did Mary see him?
b. *As for who, did he see Mary?
c. *As for where, did John see Mary?

This follows from two factors: first, detached elements are highly topical, and WH expressions are focal. Second, the scope of the interrogative illocutionary force (IF) operator is the clause, and the LDP is outside of the clause and therefore outside of the scope of the IF operator; consequently, it cannot host WH expressions. If the independent RPs in (2a) were in detached positions, this would predict that they could not be replaced by WH expressions, which is not the case, as (7) shows.

(7) a. *Tuwá wówapi ki Ø-wičhá-Ø-k'u he?*
who book the INAN-3PL.ANIM.U-3SG.A-give Q
'Who gave them the book?'
b. *Wičháša ki hená táku Ø-wičhá-ya-k'u he?*
man the those what INAN-3PL.ANIM.U-2SG.A-give Q
'What did you give those men?'

The fact that WH expressions can occur in both of these positions shows that they cannot be detached positions but rather must be clause-internal.

The other candidate core-external position is the pre-core slot (PrCS), the position in which WH expressions occur in languages like English and German; non–WH expressions can occur in this position as well (8) and (9).

(8) a. [$_{\text{CLAUSE}}$ [$_{\text{PrCS}}$ What] did [$_{\text{CORE}}$ you give to those men?]]
b. [$_{\text{CLAUSE}}$ [$_{\text{PrCS}}$ That analysis] [$_{\text{CORE}}$ I don't buy.]]

(9) a. [$_{\text{CLAUSE}}$ [$_{\text{PrCS}}$ *Was*] *hat* [$_{\text{CORE}}$ *der Mann gekauft?*]]
what has the man bought
'What did the man buy?'

11. There is also a post-core slot; it was originally proposed in Shimojo (1995).

b. [$_{\text{CLAUSE}}$ [$_{\text{PrCS}}$ *Eine Flasche Wein*] *hat* [$_{\textit{CORE}}$ *der* Mann *getrunken.*]]
a bottle wine has the man drunk
'A bottle of wine the man drank.'

In contrast to the LDP, the PrCS is not subject to the same objections. First, the element in the PrCS is not set off by an intonation break, and second, the PrCS is clause internal, which means it is within the scope of the IF operator. Nevertheless, there are problems with an analysis locating the independent RPs in (2a) in the PrCS. First, there are two RPs in (2a), but there is never more than one PrCS in a clause.[12] Hence one of the RPs in (2a) is still unaccounted for. Second, while it is in principle possible for a PrCS to occur in an embedded clause, they rarely do so, and this seems to be related to the fact that occurrence in the PrCS typically signals that the RP or PP has a special discourse status, often contrastive focus or topic; such a special discourse status is difficult to reconcile with the strongly presupposed nature of most types of embedded clauses.[13] Thus, the fact that independent RPs freely occur in all types of embedded clauses in head-marking languages, as illustrated in (5), argues against their being in the PrCS.

To summarize, in a head-marking language like Lakhota, the bound argument markers on the verb are the true core arguments. A preliminary representation of the LSC of (2b) and a representation of the LSC of its English translation are given in Figure 1.

The structure of the two sentences is similar, morpheme order aside, with the crucial difference being that the elements expressing the core arguments are bound morphemes in Lakhota but free morphemes in English.

In the pronominal argument hypothesis and in the earlier discussions of head marking in RRG, the bound argument markers are assumed to be pronouns, but this is problematic for several reasons, each having to do with the binding properties of pronouns. First, pronouns in argument positions (as opposed to possessors) cannot be bound by an RP clause internally; this is well known and is canonized as Principle B of the binding theory in GB. In Jelinek's analysis, independent RPs are in detached, clause-external positions, and therefore there is no problem with respect to Principle B.[14] In the RRG

12. Instances of so-called multiple WH-movement do not involve multiple PrCSs; see Eschenberg (1999) for an RRG analysis of multiple WH questions in Polish.

13. The PrCS occurs in relative clauses with a relative pronoun; it is the location of the relative pronoun. It also occurs in embedded questions, and it provides the slot for the WH-expression: for example, *John doubts what Mary said*. What is meant here, and what is unusual, is a PrCS in an embedded clause that does not host the subordinator: **John doubts that the car Bill stole*.

14. This supports the earlier suggestion (see Footnote 10) that the RPs must be adjoined to a node very high in the left periphery, in X-bar terms.

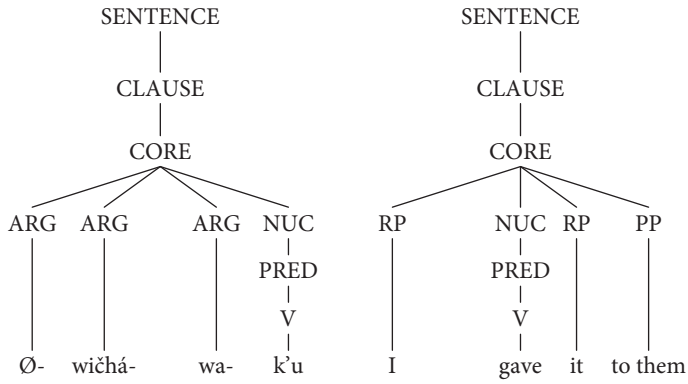

Figure 1. The structure of (2b) (preliminary) and its English equivalent

analysis, on the other hand, the independent RP is clause-internal and therefore cannot bind a true pronoun in an argument position within the same clause; consequently, the bound argument markers cannot be true pronouns. Second, if they were true pronouns, they should only be able to cross-reference definite RPs, since pronouns are themselves definite, as pointed out by Austin & Bresnan (1996). Yet there is no problem with the cross-referencing of indefinite RPs, as (10) shows. In both examples the relevant RP is indefinite and plural, in order to have explicit cross-referencing on the verb; third-person-singular actor and undergoer do not trigger any overt morphological marking.

(10) a. *Mathó eyá na-wíčha-wa-xʔu*
bear some stem-3PL.ANIM.U-1SG.A-hear
'I heard some bears.'

b. *Nawíčhawaxʔu*
'I heard them.'

c. *Mathó eyá hí-pi.*
bear some come-PL
'Some bears came.'

d. *Hípi.*
'They came.'

How can the referential nature of the affixes illustrated in (10b) and (10d) be reconciled with the indefinite RPs cross-referenced in (10a) and (10c)? The answer lies in the nature of the indefinite articles in Lakhota: there are three sets of indefinite articles, specific indefinite, as in (10); nonspecific indefinite (non-negative); and nonspecific indefinite (negative). If the cross-referencing elements are analyzed as instantiating a specific referent, not a definite referent like a true pronoun such as *he*, *she,* or *it*, then they would be fully compatible with both definite and indefinite RPs. Moreover, since

they are not true pronouns, they are not subject to Principle B and can cross-reference clause-internal RPs. They cannot be anaphors, as they are capable of independent reference, as in (10b) and (10d). They thus represent a new kind of referring expression, one that falls between pronouns and anaphors.[15] How is it that they receive a pronominal interpretation in sentences such as (10b) and (10d)? The interpretation could be the result of a Gricean implicature: the use of the bound form alone to indicate a referent signals to the hearer that the speaker believes that the hearer can identify the referent. Definiteness is often analyzed as a combination of referentiality and identifiability (Lambrecht 1994), and therefore the marker is interpreted as signaling an identifiable referent and thereby functioning as a pronoun.

This analysis would seem to predict that indefinite nonspecific RPs, which would be marked by one of the other two types of indefinite articles, would not be cross-referenced on the verb, but this surprisingly is not the case, as (11) shows.

(11) a. *Mathó etą́ na-wíčha-ya-xʔų he?*
bear some stem-3PL.ANIM.U-2SG.A-hear Q
'Did you hear any bears?'

b. *Nawíčhayaxʔų he?*
'Did you hear them?'/*'Did you hear anything?'

c. *Lakhóta tuwéni hí-pi-šni.*
Indian no come-PL-NEG
'No Indians came.' (Rood & Taylor 1996:456)

d. *Hípišni.*
'They did not come.'/*'No one came.'

The question operator *he* and the negation operator *-šni* license the nonspecific indefinite articles *etą́* 'some' in (11a) and *tuwéni* 'no, none' in (11c), respectively; yet the RPs marked by these articles are cross-referenced on the verb. This would seem to call into question the analysis of the cross-referencing elements as being referential. Note, however, that when the question or negation operator occurs with the inflected verb alone, as in (11b) and (11d), the referential specificity of the argument marker is unaffected. This indicates that in order to suspend the reference of this argument, some additional means beyond the negation or question operator are required: namely, the independent

15. In GB Binding Theory, there is such a hybrid type, the pronominal anaphor exemplified by PRO, which could either be controlled or refer arbitrarily. The Lakhota argument markers are not instances of PRO, as Van Valin (1987) argued in detail, but the notion of "pronominal anaphor" is fitting. The affixes can be bound locally, as in (2a), like an anaphor, or they can refer independently, as in (2b), like a pronoun. The fact that standard binding theories do not include such an overt element may be a reflection of the point made by Nichols that grammatical theory is biased toward the kind of phenomena found in dependent-marking languages.

RP containing the appropriate indefinite-nonspecific article plus the operator. The RP-operator combination cancels the reference of the affix, rendering it nonspecific. The function of the construction is to suspend reference of one of the arguments of a predicate, and it does not depend on the presence of any potential cross-referencing morphology. It was mentioned earlier (Footnote 4) that inanimate arguments do not trigger any kind of cross-referencing morphology on transitive verbs. Nevertheless, transitive verbs are interpreted as having a specific inanimate undergoer, even if the morphosyntactic features of the argument do not have any exponent, as illustrated in (12a) and (12b).

(12) a. *Ixʔé ki (hená) wą-bl-áke/*wą-wíčha-bl-áke.*
rock the (those) stem-1SG.A-see/stem-3PL.ANIM.U-1SG.A-see
'I saw the/those rock(s).'

b. *Wąbláke.*
'I saw him/her/it/them[INAN]/*them[ANIM].'

c. *Čhą́-thipi etą́ wą-l-áka he?* (Rood & Taylor 1996: 456)
wood-house some stem-2SG.A-see Q
'Did you see any houses?'

d. *Čhą́-thipi tákuni wą-bl-áke-šni.*
wood-house none stem-1SG.A-see-NEG
'I didn't see any houses.'

Inanimate undergoers are not cross-referenced on the verb, as (12a) and (12b) clearly show, yet the combination of indefinite nonspecific article plus operator has exactly the same effect in (12c) and (12d) as in (11), despite the lack of cross-referencing morphology. Hence the purpose of these constructions is to suspend the reference of an argument, and therefore the input to the construction must be a verb form with specific reference to the relevant argument. Thus there is no contradiction in having these indefinite nonspecific RPs cross-referenced on the verb; indeed, the negation and question operators alone cannot suspend the reference of the argument, as (11b) and (11d) show. Thus it may be concluded that the argument markers are not true pronouns but rather express a specific argument, which may be either a local RP or a discourse antecedent. As suggested in Footnote 15, they could be taken to be pronominal anaphors, albeit in a difference sense from the pronominal anaphor (PRO) of GB theory.

The structure proposed for (2b) raises the vexing question of the status of independent RPs in sentences like (2a). There are good reasons to reject the analysis of the independent RPs as being in a dislocated position like the LDP or as being in the PrCS. There are, moreover, good reasons to analyze them as being clause internal. They are, therefore, core external but clause internal. The LSC can accommodate independent RPs inside the clause but outside the core, and it does this by allowing them to be direct daughters of the clause node, as in Figure 2.

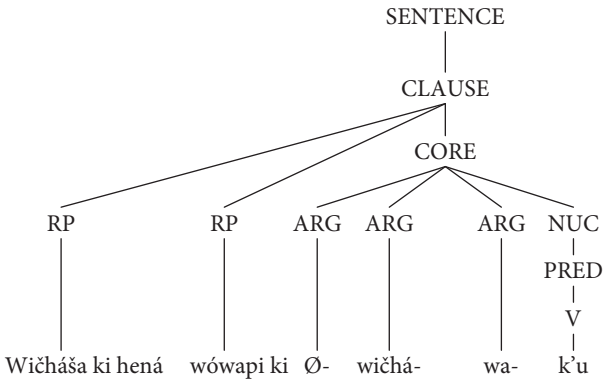

Figure 2. The structure of (2a)

These positions, which we may label "extra-core slots" (ECSs), are structurally analogous to the PrCS, in that they are direct daughters of the clause node, but they differ from it in six important ways. First, they are not associated with any special pragmatic or discourse function; they may be topical or focal. Second, there can be more than one of them. Third, they are not positionally restricted. They need not be pre-core; in a verb-initial head-marking language, such as Tzutujil (Dayley 1981), they would follow the verb, and in a verb-medial head-marking language, such as Nunggubuyu (Heath 1984), they would precede and follow. These post-core positions differ from the post-core slot (PoCS) by their lack of a distinctive discourse function, usually contrastive focus for the PoCS. Fourth, as noted above, because of the distinctive discourse function of the element in the PrCS or PoCS, they are largely restricted to main clauses, while independent RPs occur freely in all types of embedded clauses. Fifth, the PrCS/PoCS can host either arguments or non-arguments (adjuncts), while the independent RPs in ECSs must be instantiations of the arguments of the verb. Adjuncts (non-arguments) occur in a periphery. Sixth, pre- and post-core slots are found in both head-marking and dependent-marking languages, whereas ECSs are found only in head-marking languages. Verb-initial head-marking languages provide a clear contrast between the PrCS and ECSs, as in the following Tzutujil examples (Dayley 1981); the structure of each is given in Figure 3 (13).

(13) a. *X-Ø-uu-ch'ey jar aachi jar iixoq.*
PST-3ABS-3ERG-hit CLF man CLF Woman
'The woman hit the man.'

b. *Jar aachi x-Ø-uu-ch'ey jar iixoq.*
CLF man PST-3ABS-3ERG-hit CLF woman
'It was the man who the woman hit.'

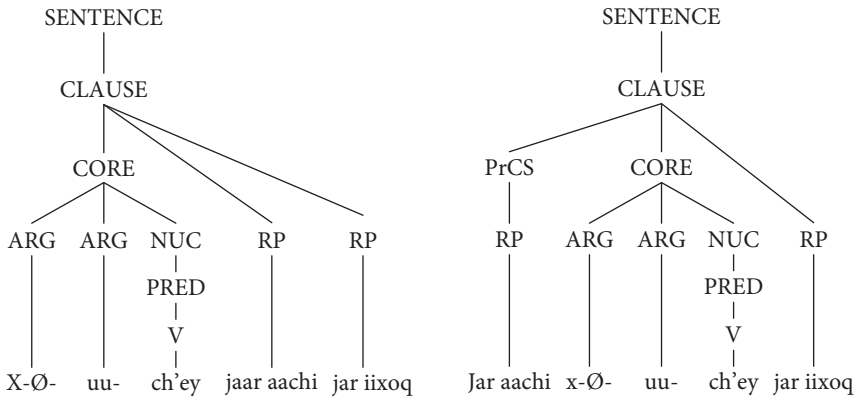

Figure 3. The structure of (13a) and (13b) from Tzutujil[16]

The structure in (13a) represents the basic, unmarked transitive clause pattern, with two independent RPs in ECSs following the core. In (13b), on the other hand, one of the arguments has been moved to the PrCS, which signals contrastive focus; in this example, one RP is in the PrCS and the other, in a postverbal ECS.

Thus there seem to be two types of core-external positions, the properties of which are summarized in Table 1.

Table 1. Comparison of types of extra-core positions

	PrCS/PoCS	**ECS**
Special discourse-pragmatic function	Yes	No
Restricted to single instantiation	Yes	No
Positionally restricted	Yes	No
Hosts arguments and adjuncts	Yes	No
Restricted primarily to main clauses	Yes	No
Occurs in both HM and DM languages	Yes	No

Every language can in principle have an extra-core position in its clause structure; hence the theory allows positions in the clause that are outside of the core and are daughters of the clause node, and these positions can be "specialized" in various ways, yielding complementary sets of attributes. If a position has special discourse-pragmatic functions, such as signaling contrastive focus, then certain things follow

16. The tense prefix would be attached to the structure via the operator projection, which is not represented here.

from this. First, there is normally only one contrastive focus in a clause, and therefore there should only be one of these positions in a clause in a given utterance. Furthermore, the beginning or end of the clause is a particularly salient position for elements with a special discourse-pragmatic status, and so it is natural that these special positions would be found in these locations in the clause. Moreover, since arguments and adjuncts can function as e.g. contrastive foci, both should be able to appear in these positions. With respect to complex sentences, most embedded clauses are presupposed, and consequently, it should be difficult for these discourse-pragmatically specialized positions to occur in embedded clauses (see Footnote 13). Finally, since every language can express discourse-pragmatic functions such as (contrastive) topic or focus, it is in principle possible for any language, be it dependent marking or head marking, to have a PrCS or PoCS (or both), as appropriate. Thus the properties of the PrCS/PoCS seem to stem directly from its specialized role in the information structure of utterances.

Do the collective properties of ECSs follow from their lack of discourse-pragmatic specialization? It appears that all but one do indeed follow from this. If the elements in the ECS have no special discourse-pragmatic function, then there is no reason for the number of them to be restricted for information-structural reasons. There can be as many as there are arguments of the predicate in the nucleus. If they have no special discourse-pragmatic function, then there is no reason for them to be restricted to particular locations within the clause. For the same reason, there is no reason for them to host adjuncts as well as arguments, because there are already pragmatically unspecialized locations for adjuncts in the LSC in all types of languages: namely, the peripheries. With respect to complex sentences, the lack of discourse-pragmatic specialization means that RPs in ECSs are equally at home in presupposed embedded clauses as in asserted main clauses. However, the last property, the restriction to head-marking languages, does not seem to follow in any way from this lack of discourse-pragmatic specialization. Accordingly, the important typological and theoretical question is, why are ECSs restricted to head-marking languages only?

One part of the answer is straightforward: because the core argument positions in a head-marking language are occupied by bound forms, the only clause-internal position available for an independent RP to occur in would be an extra-core position. Hence ECSs are required in head-marking languages. But why do they not occur in dependent-marking languages? In other words, why do dependent-marking languages not have RPs in ECSs together with independent pronouns in core argument positions? Why is there only the PrCS or PoCS? In all languages there is a constraint on the instantiation of referents functioning as arguments of the predicate in the nucleus to the effect that each referent with a specific argument function may be instantiated

no more than once per core.[17] The crucial difference between head-marking and dependent-marking languages is that this restriction has been extended to the *clause as a whole* in dependent-marking languages: each referent functioning as an argument may be instantiated no more than once per clause, either in the core or in the PrCS/PoCS, but not both.[18] The effect of this restriction can be seen in the lack of resumptive pronouns for arguments in the PrCS/PoCS in dependent-marking languages. A resumptive pronoun for an argument in the LDP/RDP, on the other hand, does not violate this principle, because the LDP/RDP is outside of the clause and only the resumptive pronoun is clause internal. This constraint interacts with the fundamental RRG principle that the semantic arguments of the predicate in the nucleus must occur in the core by default, in the following way: in the absence of any compelling discourse-pragmatic motivation, a semantic argument must occur in the core as a core argument,[19] and given the constraint that only one instantiation of the referent functioning as an argument is allowed per clause, this eliminates the motivation for ECS structures like those in Figures 2 and 3 in dependent-marking languages.

It was mentioned in Section 3 that in Distributed Morphology, "open class words are composed of at least two component morphemes, an encyclopedic component and a purely formal component" (Pensalfini 2004: 360–361). In other words, each referent is instantiated by a morpheme expressing person, number, and other such "formal"

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17. Appositives like *John, my best friend, is very sick* are not exceptions, because appositives are in effect a reduced non-restrictive relative clause and thus are RP-internal constituents (see Van Valin 2005: 222–223); there is only one RP instantiating the referent *John* in the matrix core of the clause.

18. This explains the usual complementarity between clitic pronouns and independent RPs in dependent-marking languages. In some languages, however, clitic doubling occurs – that is, the cooccurrence of a clitic pronoun and an independent RP as in some varieties of Spanish – and this represents a transition toward a head-marking-type system. Belloro (2004a, 2004b, 2007) presents an RRG analysis of clitic doubling in Spanish, which attempts to capture the typologically transitional nature of the phenomenon; Kailuweit (2008) presents a head-marking analysis of Spanish clitic-doubling structures. In Nichols & Bickel (2005), this phenomenon is referred to as "headward-migrated dependent marking." It should also be noted that multicore clauses like *John$_i$ asked Mary to help him$_i$* are not counterexamples to this principle, for the following reason: The referent "John" is instantiated twice, once by *John* and once by *him*, but these represent two different arguments; that is, *John* is the actor of *ask*, whereas *him* is the undergoer of *help*. The constraint applies to the instantiation of a referent serving as one particular argument.

19. This default can also be constructionally overridden, for example, as in a passive construction when the actor argument occurs in the periphery as an adjunct, rather than as a core argument.

features, on the one hand, and by a morpheme expressing its substantive lexical content, according to this view. This is claimed to be true universally, but this cannot be the case. It is correct for head-marking languages, in which the "formal" component is realized by the bound core argument and the lexical ("encyclopedic") component by the independent RP in an ECS, but it is not correct for dependent-marking languages, for it would violate the "one instantiation of a referent per clause" principle.

Another question that arises is, how is the number of RPs in a clause constrained? What is to prevent too many RPs from occurring with a given verb? The relevant constraints are found in the RRG linking algorithm, in semantics-to-syntax linking and in syntax-to-semantics linking. A fundamental constraint governing the linking is the Completeness Constraint (Van Valin 2005: 129–130), which states, in essence, that all referring expressions in the syntax must be linked to an argument position in the semantic representation and that all lexically filled argument positions in the semantic representation must be realized in the syntax.

The RRG account of linking in head-marking languages will focus on the Lakhota sentence in (14).

(14) *Mathó ki wo-wíčha-wa-t'į-kte.*
bear the do.by.shooting-3PL.ANIM.U-1SG.A-die-FUT.IRR
'I will shoot the bears to death.'

The verb is *wot'á*, which is composed of the instrumental prefix *wo-* 'do by action from a distance' and the verb *t'á* 'die', yielding 'cause to die by action from a distance' – that is, 'shoot to death' or 'kill by shooting'; the form *wot'į-* is due to a morphophonemic change triggered by the future/irrealis clitic *-kte*.[20] The steps in the semantics-to-syntax linking are (1) construct a semantic representation, based on the logical structure of the predicate; (2) assign actor and undergoer; (3) select an argument to be the privileged syntactic argument and assign case; (4) select the appropriate syntactic templates; and (5) link the elements into the appropriate positions in the clausal syntactic template.[21] One immediate complication that sentences like (14) pose is that there are three referring expressions in the clause – that is, *mathó ki* 'the bear', *wičha-* 'them [animate]', and *wa-* 'I' – but the verb is transitive and has only two arguments: [**do.by.action.from.distance′** (x, Ø)] CAUSE [BECOME **dead′** (y)]. However, *mathó ki* 'the bear' and *wičha-* 'them' are not referentially distinct; that is, they denote the same participant in the event. Hence they both instantiate the *y* argument and must, therefore, both fill the *y* argument slot in the logical structure. Thus the logical structure for (14) would be [**do.by.action.from.distance′** (1SG, Ø)] CAUSE [BECOME **dead′**

20. Rood & Taylor (1996) analyze *kte* as a clitic rather than as a suffix.

21. See Van Valin (2005: 136–149) for detailed discussion and exemplification.

(3PL.ANIM [mathó])]. The obligatory instantiation of the participant is the prefix *wičha-*; the optional RP *mathó ki* is in brackets to signal its secondary status.[22] The affix will be linked to a slot in the core of the clause, while the RP will be linked to a position in the clause but outside of the core. This satisfies the Completeness Constraint. This is illustrated in Figure 4.

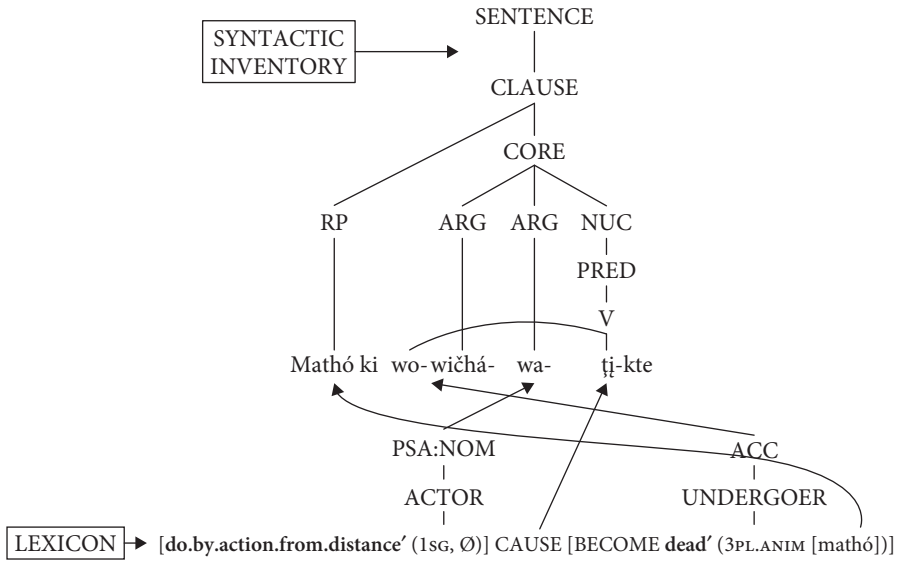

Figure 4. Linking from semantics to syntax in (14)

Given that the semantic representation is based on the logical structure of the verb, there is no possibility of an unaffiliated RP being generated.

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22. This double filling of an argument position is not unique to head-marking languages. In an English sentence like, *It surprised everyone that Mary was the culprit*, both *it* and *that Mary was the culprit* fill the first argument position of *surprise*. See Van Valin & LaPolla (1997: 528). This sentence does not violate the principle of one instantiation of a referent per clause, because there is no referent involved: the *it* cataphorically refers to the extraposed clause, which expresses a proposition and does not instantiate a referent. The structure of sentences involving extraposed clauses does in fact mirror that of head-marking languages: *it* is in a core argument position, while the extraposed clause is outside of the core but inside the clause (see Van Valin 2005: 199). Thus such structures are possible in dependent-marking languages, if there is no double instantiation of a referent within the clause, and this means that this structure is restricted to propositional arguments only. This structure is motivated by a number of considerations, including the principle of symmetry in clause linkage (Van Valin 2005: 198–200), a principle that applies equally in both types of languages.

RRG also provides for a linking from the syntax to the semantics.[23] The steps are (1) the parser outputs a syntactic representation; (2) semantic information is gleaned from the morphosyntactic form, – that is, from word order, case, voice, and so forth; (3) the logical structure of the predicate is accessed in the lexicon, and as much information is deduced from it as possible; and (4) the information from steps (2) and (3) is matched up.[24] A crucial part of step 2 in head-marking languages is that independent RPs must be associated with a bound marker on the verb, in order to be interpreted. In the case of (14), there is one RP, *mathó ki* 'the bear', which is third person, animate and unmarked for number, and there are two bound argument markers on the verb, one first-person singular (*wa-*) and the other third-person plural animate (*wičha-*). The RP is compatible with only one of the bound markers, *wičha-*, and consequently it is associated with it.[25] It is accusative, and therefore the argument *mathó ki*/*wičha-* is the undergoer. The other argument marker is in the nominative case, and therefore it is the actor. Based on the logical structure of the verb, [**do.by.action.from.distance′** (x, Ø)] CAUSE [BECOME **dead′** (y)], it can immediately be determined that the *x* argument is the actor and the *y* argument the undergoer. In the final step, the undergoer *mathó ki*/*wičha-* is linked to the *y* argument, and the actor *wa-* is linked to the *x* argument in the logical structure, thereby satisfying the Completeness Constraint. This is summarized in Figure 5.

If there had been two RPs, as in **Mathó ki šų ŋmánitu ki wowíčhawat'į kte* [bear the coyote the them-I-kill.by.shooting-FUT] 'I will shoot the bear(s) the coyote(s) to death', one of the RPs cannot be associated with an argument marker on the verb and therefore cannot be linked to the semantic representation, resulting in a Completeness Constraint violation. Thus the Completeness Constraint guarantees that there can be no more independent RPs in a clause than compatible feature bundles for the arguments of the verb.

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23. In this regard RRG is somewhat unusual, as it links bidirectionally. This is a reflection of what speakers and hearers do: in language production the speaker maps a semantic representation into a syntactic representation, which will then be uttered, whereas in language comprehension the hearer maps from the syntactic representation to the semantic representation, in order to interpret the sentence. See Van Valin (2006) for discussion of RRG in relation to language-processing models.

24. See Van Valin (2005: 149–158) for detailed discussion.

25. If the independent RP is compatible with both of the markers on the verb – for example, *Mathó ki na-Ø-Ø-xų́* [bear the stem-3SG.A-3SG.U-hear] – then the sentence is ambiguous; that is, this can mean either 'The bear heard him/her/it' or 'He/she heard the bear'.

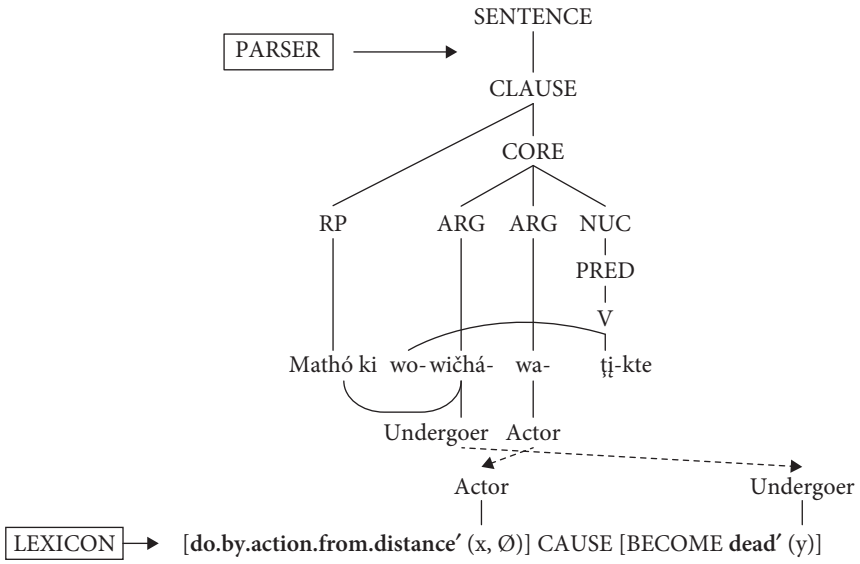

Figure 5. Linking from syntax to semantics in (14)

5. The layered structure of the clause and the layered structure of the word

The analysis of head-marking languages presented here raises an important issue regarding the morphology-syntax interface. Since Chomsky (1970), many linguists have assumed something like the principle of lexical integrity in (15): for example, Lapointe (1981), DiSciullo & Williams (1987), and Bresnan & Mchombo (1995).

(15) Syntactic rules are not allowed to refer to the internal morphological structure of words.

The analysis of Lakhota control constructions presented in Section 2 appears to be incompatible with this, as it asserts that it is precisely the argument features on the verb that the syntax targets in the control construction and others. However, it has been noted that (15) is too strong – for example, by Anderson (1982) and Haspelmath (2002) – and that the inflectional properties of words can be accessible to the syntax. Finite verb agreement in languages like German and English is relevant to this discussion; they are instances of inflectional morphology relevant to the syntax, but they do not play a role in the syntax the way the bound argument markers in Lakhota and other head-marking languages do. Moreover, it is widely agreed that the derivational properties of words are not accessible to the syntax. So the question is, What kind of morphological theory is compatible with the RRG analysis of head-marking languages and at the same time represents inflectional and derivational morphology in such a

way that inflectional features can be targeted by the syntax and derivational features cannot be?

There is as yet no full-blown RRG theory of morphology, but Everett (2002) laid out a sketch of what a possible RRG theory would look like. He characterizes it as an "inferential-realizational" theory, along the lines of Stump (2001).[26] It follows the RRG concept of layering, positing a layered structure of the word analogous to the layered structure of the clause and of other phrases. The stem is the nucleus$_W$, which may be internally complex, and inflectional affixes are formatives that are daughters of the core$_W$; clitics are formatives that attach to words in detached positions analogous to those in the sentence.[27] The basic structure of the layered structure of the word and an example from English, *refusals*, is given in Figure 6.

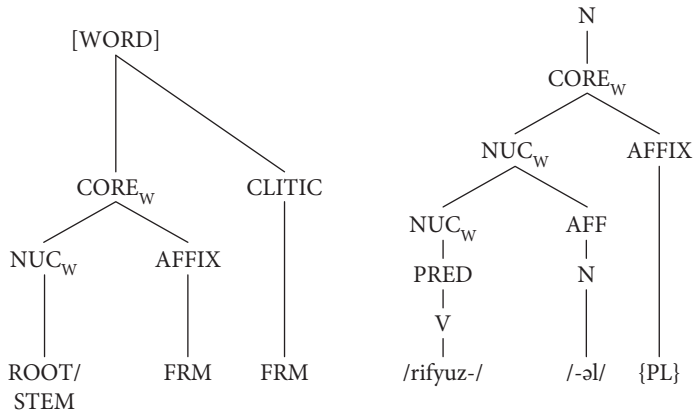

Figure 6. The layered structure of the word (template), the layered structure of *refusals*

The internal structure of the nucleus$_W$ is opaque to the syntax; as far as the syntax is concerned, *refusals* is no different from *dogs* or *houses*. The number feature is instantiated by the plural suffix in the core$_W$ and is, however, accessible to the syntax for agreement purposes, for example. Hence derivation is captured within the nucleus$_W$, while inflection is represented within the core$_W$. These structures can be considered to be morphological templates for words, analogous to the syntactic templates for

26. For further developments of these ideas, see Martin Arista (2008), Nolan (2009) and Boutin (2009), and for work on derivational morphology in RRG, see Cortés-Rodríguez & Pérez Quintero (2002), and Cortés-Rodríguez (2006).

27. Everett (1996) argues that clitics are distinguished from affixes primarily in their manner of attachment.

clausal structures posited in RRG.[28] Just as syntactic templates for clausal structures are selected based on the logical structure of the clause, so would morphological templates be selected based on the semantic representation of the word.

In many of the glosses, there has been a 'Ø' indicating certain third-person arguments (see Footnote 4), and they may now be understood as representing person, number, and animacy specifications of arguments for which there is no morphological exponent, namely {3SG} and, with transitive verbs, {3PL.INAN.U}. The function of the third-person singular argument is irrelevant; regardless of whether it is actor, undergoer, or a nonmacrorole argument, its morphological exponent is the same: namely, nothing. Hence the morphological structure of *wičháwak'u* 'I gave it to them' in (2b) would be as in Figure 7 (see Figure 1).

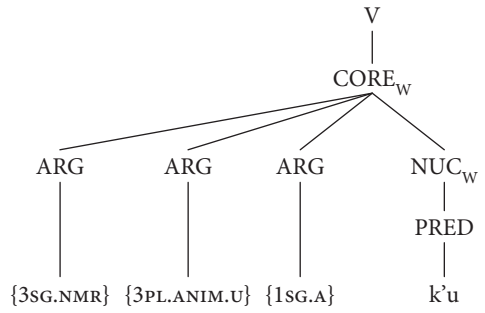

Figure 7. The layered structure of the word *wičháwak'u* 'I gave it to them' in (2b)[29]

Since the nucleus is a verb, the formatives that are daughters of core$_W$ will be labeled as 'arguments'; their status as affixes follows from the structural definition given earlier.

All of the cases examined thus far have been ones in which the exponent of the morphosyntactic feature bundle could equally well have been expressed by a simple traditional morpheme in a lexical, nonrealizational framework. However, Lakhota has its share of problematic cases, and two of them are particularly relevant for this discussion. The first concerns stative verbs with inanimate subjects. The only instance in which the number of an inanimate argument is explicitly coded is with the plural subject of a stative verb, as illustrated in (16d).

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28. Two differences between the layered structure of the word and that of clauses and RPs concern the lack of peripheries and an operator projection in the layered structure of the word. This is due to the lack of word-internal modifiers modifying the layers of the word.

29. Lakhota shows secondary-object alignment, and therefore the recipient rather than the theme is the undergoer.

(16) a. *Wičháša ki háṣke.*
man the tall
'The man is tall.'

b. *Wičháša ki hená háṣka-pi.*
man the those tall-PL
'Those men are tall.'

c. *Čhą́ ki háṣke.*
tree the tall
'The tree is tall.'

d. *Čhą́ ki hená háṣkaska.*
tree the those tall.PL
'Those trees are tall.'

The exponent of {3PL.ANIM.U} is the suffix *-pi*, while the exponent of {3PL.INAN.U} is reduplication of the stative verb. In both (16a′) and (b′), the morphological structure involves two elements, *háṣka* plus either {3PL.ANIM.U} or {3PL.INAN.U}, but the realization of these combinations is quite different. A second example involves suppletion in the argument-marking paradigm. When the actor is first-person singular and the undergoer second person, the expected affix combination **ni-wa* does not occur; rather, these two forms are replaced by a portmanteau form, *-čhi-*.[30] If the verb in Figure 7 is changed to 'I gave it to you', then the form would not be the expected **Ø-ni-wá-k'u* [3INAN-2SG.U-1SG.A-give] but rather *Ø-čhi-č'ú* [3INAN-1SG.A+2SG.U-give].[31] There would be a special realization rule for the combination that would take precedence over the more general rules governing the instantiation of {1SG.A} and {2U}, following Pāṇini's principle: namely, that more specific rules take precedence over more general rules (Stump 2001).

The morphological structure of the word *wowíčháwat'įkte* 'I will shoot them to death' from (14) is given in Figure 8. It contains a complex $\text{nucleus}_{\text{W}}$ composed of two nuclei_{W} *wo-* 'do by action from a distance' and *t'a* 'die',[32] along with two bundles of

30. In some head-marking languages – for example, Oneida (Koenig & Michelson 2009) – all marking on transitive verbs involves nondecomposable forms that signal actor and undergoer simultaneously; there are no distinct actor or undergoer affixes on Oneida transitive verbs. See Koenig & Michelson (2009) for an HPSG-based account of the differences between head-marking and dependent-marking languages that treats independent RPs as semantic but not syntactic arguments of the verb.

31. /k/ – > /č/ after /i/ is a regular morphophonemic alternation for nonstative verbs.

32. The internal structure of complex nuclei_{W} would be characterizable in terms of the nexus types that characterize complex sentences. *Refusals* in Figure 6 is an example of $\text{nuclear}_{\text{W}}$ subordination, since the verb root *refuse* is nominalized by the suffix *-al*, while in Figure 7 the relation between the nuclei_{W} is $\text{nuclear}_{\text{W}}$ cosubordination, since the roots co-predicate.

morphosyntactic features, {3PL.ANIM.U} and {1SG.A}, which will be instantiated by two $core_W$-level affixes, *wičha-* and *wa-*, respectively, along with a clitic, *kte* instantiating the feature 'future-irrealis'.

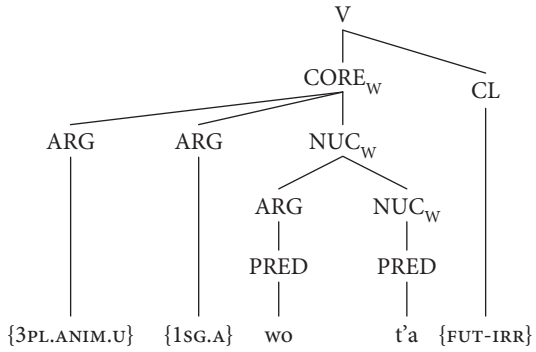

Figure 8. The layered structure of the word *wowíčhawat'įkte* 'I will shoot them to death'

In the representation in Figure 8, the feature bundles for the core arguments are not represented as infixes. As mentioned earlier (Footnote 7), some verbs take the core argument markers as infixes, others as prefixes, and this is an idiosyncratic property of particular verbs; for example, roughly half of the instrumental prefixes take them as prefixes in derived verbs, the other half as infixes. In morphological representations like the one in Figure 8, they will be represented as prefixes, with the actual instantiation determined by the morphophonological rules associated with the morphological rules. There is no difference in the syntactic status of prefixed versus infixed argument markers.

The $core_W$ structure in Figure 8 bears a striking resemblance to the structure of the core in the clauses in Figures 4 and 5, and this is no accident, since the inflectional affixes in the $core_W$ also instantiate the core arguments in the core of the clause. Thus it appears to be the case that in Lakhota, and in head-marking languages in general, the core of the verb and the core of the clause are coextensive; that is, the $nucleus_W$ of *wowíčhawat'įkte*, *wot'a-*, is also the nucleus of the clause, and the argument-signaling affixes in the $core_W$ are the core arguments. Hence, crucially, the structure of the $core_W$ provides the structure of the core of the clause. The structure of (14), with both constituent and operator projections for the clause, is given in Figure 9.

The significant feature of this representation is that the bound argument markers *wičha-* '3PL. ANIM.U' and *wa-* '1SG.A' are simultaneously constituents of the $core_W$ of the verb and of the core of the clause; they satisfy the valence requirements of the predicate *wot'a* at both levels. Because the valence requirements of the verb are satisfied at the morphological level, there are no open core slots for independent RPs to fill,

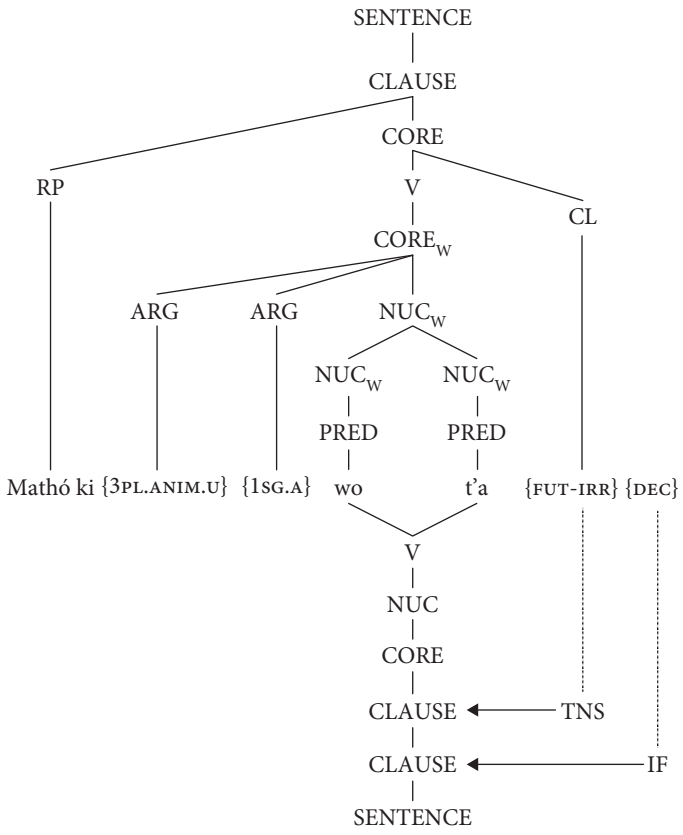

Figure 9. The structure of (14)

and accordingly they must occur outside the core. It is this structural isomorphism between core and core$_W$ that appears to be the defining property of head-marked structures, and from it follow the features discussed above. Because the core of the clause is a word, the core arguments can only be represented by affixes, which express only person, number, gender (animacy), or case, depending on the language. For a full lexical specification of the argument, a full RP is needed, and it must occur outside the core in an ECS (default) or in another extra-core position. The addition of morphological structure to the representations means that the Lakhota and Tzutujil trees in Figures 1 through 5 are no longer correct, strictly speaking; in them the argument-marking affixes are given as daughters of the clausal core node, when they are in fact daughters of the core$_W$ of the verb.

Portmanteau forms like *-čhi-* can be handled in terms of two semantic arguments mapping into one morphophonological form. This is illustrated in the linking between semantics and syntax for *čhič'ú* 'I gave it to you', as in Figure 10, which has the same

structure as the form in Figure 7. Crucially, the actor and undergoer arguments in the logical structure are realized by a single affix, *-čhi-*; the combination of first singular actor with a second-person undergoer would trigger the selection of a special morphological template. Despite there being only two overt affixes in the $core_W$, the Completeness Constraint is satisfied, because all of the specified arguments in the logical structure are realized in the morphosyntax.

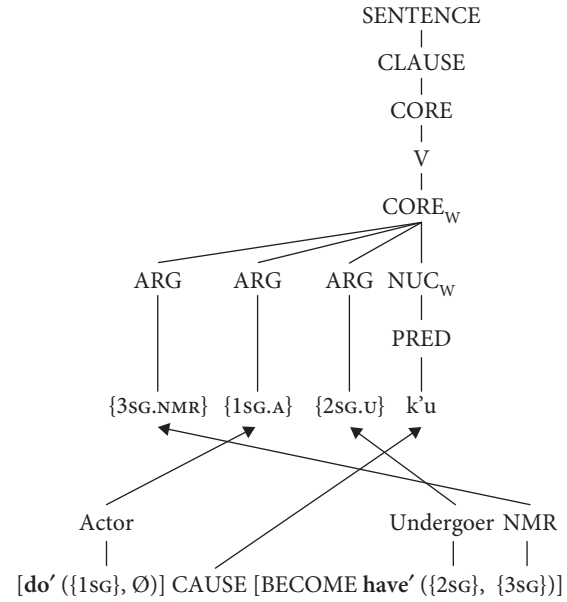

Figure 10. Linking from semantics to syntax for *Čhič'ú* 'I gave it to you'

Morphophonological rules will assign no exponent to {3SG.NMR} and realize {1SG.A}+{2SG.U} as *-čhi-*. In the syntax-to-semantics linking, *-čhi-* will be interpreted as '1SG.A+ 2SG.U' and will therefore be linked to the actor and undergoer argument positions in the logical structure of the verb.

In German, a strongly dependent-marking language, a finite verb like *läuft* 'runs' would have a similar structure to verbs in Lakhota, in that there is a $nucleus_W$, *lauf-*, and a $core_W$-level affix, *-t*, which realizes third-person singular subject and present-tense features. Given the similar word structure in Lakhota and German, why is it that the morphosyntactic features expressed by person-marking affixes in Lakhota play a direct role in the syntax while the corresponding features in German do not? The answer is that in German, English, and other non-head-marking languages, the $core_W$ of the verb is completely independent of the core of the clause and is a constituent of the nucleus of the clause. The affix signals the person and number features of

the subject in German for agreement purposes, but it does not map onto an argument position in the core. The structure of (14) in Figure 9 contrasts sharply with the structure of the German sentence *Der Mann läuft* 'the man runs', given in Figure 11.

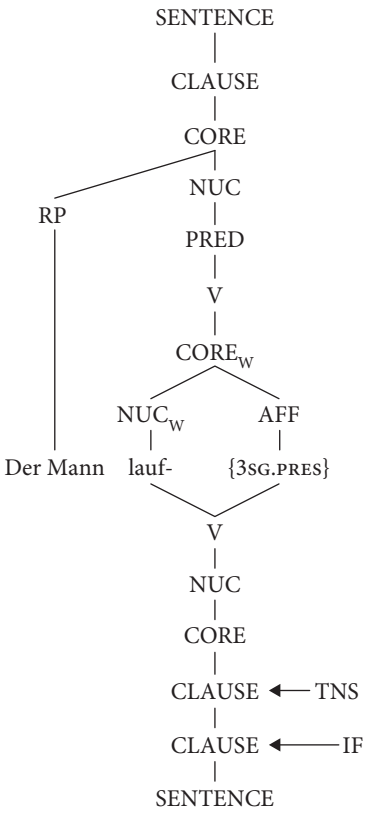

Figure 11. The structure of *Der Mann läuft* 'the man runs'

In this structure the core$_W$-level affix indicating third-person singular subject (*-t*) is part of the clausal nucleus and does not have any structural connection to the core of the clause; the single core argument is the RP *der Mann* 'the man'.

It was mentioned in Footnote 5 that there are double-marking languages, which have bound argument markers as well as case on independent RPs. Double-marking languages cover a wide typological range, from basically head-marking languages with case marking, such as Kabardian (Matasović 2008, 2009), to basically dependent-marking languages with "subject" agreement that allows the "subject" to be dropped, such as Croatian. For the first type of language, the analysis of head-marking presented here would apply; that is, the bound argument markers are the core arguments, and the case-marked RPs occur in ECSs. The second type of language raises an important

question about the status of the agreement marking on the finite verb or auxiliary, since it can function as the instantiation of the argument under certain circumstances. Examples from Croatian illustrating the issue are given in (17).

(17) a. *Marij-a* *je* *kupi-l-a* *knjig-u.*
Maria-F.SG.NOM be.3SG buy-PST-F.SG book-F.SG.ACC
'Maria bought the book.'

b. *Kupi-l-a* *je* *knjig-u.*
buy-PST-F.SG be.3SG book-F.SG.ACC
'She bought the book.'

In (17a) there is an overt RP "subject," *Marija*, and there is agreement in person and number on the finite auxiliary and in gender on the main verb, whereas in (16b) the "subject" argument is expressed solely by the agreement morphology on the verbal complex. It is implausible to claim that the verb complex in (17a) has a structure analogous to that in Figure 11 and that the verb complex in (17b) suddenly shifts to a structure like that in Figure 9 when the "subject" RP is omitted. Rather, the simplest and most plausible analysis is that in both examples, the structure is that in Figure 11. This accounts for (17a) directly, but raises the question of how the agreement morphology in that structure can instantiate a core argument. Does the agreement violate the constraint against double instantiation of a referent within the clause? It does not, because it is not directly a constituent of the core of the clause, unlike the bound argument markers in Figure 9. However, it expresses the person, number, and gender features of the argument, and these features are accessible to the syntax, minimally for agreement purposes. Only in the absence of an independent RP (nominal or pronominal) can the agreement morphology count as the instantiation of the argument; this idea was originally put forward in Bresnan & Mchombo (1987). This reflects two fundamental properties of dependent-marking languages. First, instantiation of arguments via independent pronouns and nominal expressions has priority over morphological expression of arguments, which is exactly the opposite of the situation in head-marking languages. Second, the structure of the core_{W} of the verb does not reflect, and is independent of, the structure of the core of the clause. Thus morphological expression of the person, number, and gender features of the highest-ranking macrorole argument functions as agreement when there is an RP instantiating it, but in the absence of an RP the agreement morphology may serve to instantiate it.[33]

33. An obvious question is why German and other non-"pro-drop" languages with such agreement do not allow the agreement morphology on the verb to instantiate the argument; an answer to this is beyond the scope of this paper.

Thus the RRG approach to word structure, the layered structure of the word, makes it possible for person-marking affixes to play a direct role in the syntax in head-marking languages, due to the structural parallels between the layered structures of the clause and of the word. Moreover, it "hides" derivational morphology from the syntax inside the nucleus_W and allows the morphosyntactic features expressed by inflectional affixes in the core_W to be accessible to the syntax. Even though the approach is in only the initial stages of development, it has shown itself capable of accounting for the difference between head- and dependent-marking structures, and this suggests that it will be a productive means of investigating the syntax-morphology interface.

6. Conclusion

Head-marking languages provide a profound challenge to theories of language structure, due in part to the origin of the widely assumed descriptive categories and theoretical concepts in the analysis of dependent-marking languages, as Nichols (1986) argued. They raise significant questions not only for syntactic theory but for morphological theory as well. This paper has presented the Role and Reference Grammar approach to the analysis of head-marked clause structure, showing how the differences and similarities between it and dependent-marked clause structure can be captured in a principled way. In addition, the nascent RRG approach to word structure, the layered structure of the word, provides an account of the morphology-syntax interface that captures the similarities and differences between the two types of language. The account presented here is a solution to the important descriptive and theoretical problems raised by head-marking languages that were pointed out by Nichols in her seminal 1986 paper.

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