A Role And Reference Account On Lakhota And Cheyenne Relative Clauses

Avelino Corral Esteban
Universidad Autónoma De Madrid

Abstract. This article offers a study of relative clauses in two Native American languages within the framework of Role and Reference Grammar (hereafter RRG) (Van Valin and LaPolla 1997). Despite the fact that these two languages realize these complex constructions very differently, an RRG analysis will make it possible to see both the similarities and differences between them, as well as to solve the multiple difficulties that arise when devising the logical structure for these clauses and developing their linking algorithms. Two factors play a key role in the formation of relative clauses largely, namely the type of antecedent and the presence or absence of an element in the relative clause that is coreferential with the antecedent. After checking the type of NP that is accessible to relativization by resorting to the NP accessibility hierarchy, a complete analysis of these clauses in both languages will be offered, together with a representation of the bidirectional linking system for this construction.

Keywords: *Relative clause, head-marking languages, NP accessibility, linking algorithm.*

Resumen. Este artículo trata el estudio de las oraciones de relativo en dos lenguas nativas norteamericanas de acuerdo con el marco de la Gramática del Papel y la Referencia (Van Valin and LaPolla 1997). A pesar de que estas dos lenguas realizan estas construcciones complejas de forma muy diferente a como lo hace el inglés, un análisis basado en la Gramática del Papel y la Referencia de estas construcciones nos permitirá ver tanto las similitudes como las diferencias existentes entre ellas, además de solventar las múltiples dificultades surgidas al confeccionar la estructura lógica para estas oraciones y realizar sus algoritmos de enlace. Dos factores importantes influyen especialmente en la formación de las oraciones de relativo, a saber, el tipo de antecedente y la presencia o ausencia de un elemento en la oración de relativo que sea correferencial con el antecedente. Después de comprobar los tipos de frase nominal que son accesibles a relativización recurriendo a la jerarquía de accesibilidad de la frase nominal, se ofrecerá un minucioso análisis de estas oraciones en ambas lenguas junto con una representación del sistema de enlace bidireccional para esta construcción.

Palabras Clave: *Oración de relativo, lenguas con marca en el núcleo, accesibilidad de la frase nominal, algoritmo de enlace.*

1. Introduction

It is widely acknowledged that Role and Reference Grammar (RRG) provides us with an excellent method of analysis to study syntax across languages, since it has researched into the relationship among syntax, semantics and pragmatics, and has produced the Syntax-Semantics-Pragmatics Interface. It certainly manages to represent a wide range of languages, showing both the similarities and the differences existing among them, no matter how distinct they are, since all languages seem to share a common core. In this paper, I intend to show the robustness of this theoretical framework. To do this I compare the relative clauses in Lakhota and Cheyenne and show that, despite the fact that these structures take different form in each of these languages, they can be represented very similarly. To start with, I give a theoretical explanation which shows what these two languages have in common with respect to the syntax of relative clauses. Later, I explain the special linkage type which is found in this kind of complex construction. For this, I will illustrate the different kinds of nexus type with equivalent examples in both languages to make the similarities and differences between these

two languages clearer. Finally, I will explain how the linking process concerning this syntactic structure in both languages is developed.

2. An explanation on relative clauses

Relative clauses consist of subordinate clauses that serve to modify a noun or pronoun in a sentence and, therefore, function as an adjective. Among the characteristics of these clauses in Lakhota are: the order of the relative clause with respect to the main clause; the presence of two elements that share some characteristics typical of English relative pronouns; some sort of agreement among the relative clause and the marker on the head noun; and the omission of a shared argument between the main clause and the relative clause and the use of a coreferential marker on the verb.

In Lakhota, the relative clause usually comes after the noun it modifies, whether it modifies the subject or object:

(1) *Wičhaša waŋ wičhítenaškaŋškaŋ waŋyaŋg Ø-   yaŋke kiŋ hé šuŋkawakhaŋ waŋ*
   man   one   television   watching 3SG:SUB-sit the that horse   a
   Ø-   Ø-   yuhá
   3SG:SUB-3SG:OBJ-have
   'That man that /who is watching TV has a horse.' (lit. 'That man, the one that is watching TV, has a horse.')

   Main clause: <u>*Wičhaša………kiŋ hé* šuŋkawakhaŋ waŋ yuhá</u> 'That man has a horse.'
   Subordinate clause: <u>*Wičhaša* waŋ wičhítenaškaŋškaŋ waŋyaŋg yaŋka <u>kiŋ hé</u></u> 'the man who is watching TV'

(2)   *Htálehaŋ mnípiga waŋ wóyute mas´óphiye kiŋ ektá ophé- Ø-   wa-thuŋ kiŋ*
   yesterday beer one   supermarket the at   STEM-3SG:OBJ-1SG:SUB-buy the
   Ø-   bl- atké
   3SG:OBJ-1SG:SUB-drink
   'Yesterday I drank the beer that /which I bought at the supermarket.' (lit. 'Yesterday I drank the beer, the one that I bought at the supermarket.')

   Main clause: *Htálehaŋ <u>mnípiga ………kiŋ</u> blatké* 'Yesterday I drank the beer.'
   Subordinate clause: <u>*Mnípiga* waŋ woyute mas´óphiye kiŋ ektá ophéwathuŋ kiŋ</u> 'the beer which I bought at the supermarket'

As can be observed, Lakhota, in contrast with English, has internally-headed relative clauses, since the antecedent is included in the relative clause. The striking thing about relative clauses in this language is that this head noun appears accompanied by two different articles. If the term ´relative pronoun´ is understood in the traditional sense, that is, as a nominal element in the relative clause that agrees with the antecedent in the main clause, then there seems to be no relative pronoun as such in this language. Instead, it could be claimed that the features of a traditional relative pronoun are shared out between two different elements.

There is a determiner accompanying the head noun that presents two different forms depending on the number of the antecedent: *waŋ* "a" for the singular and *eyá* "some" for the plural. Indeed, these two words represent the indefinite articles in Lakhota and so they could be rendered as meaning "the one" and "the ones" respectively. As these forms are used with both definite and indefinite antecedents, it seems evident that it cannot be this first element that specifies the antecedent.

There is another element, which occupies the final position of the relative clause and indicates the definiteness and deicticness of the antecedent. This second element has two forms: *kiŋ* when the antecedent is definite and *čha* when it is indefinite. When the notion of deicticness needs to be expressed, this second element *kiŋ* is accompanied by a demonstrative *lé* "this", *lená* "these", *hé* "that", or *hená* "those", which agrees with the first element in number. This seems to be the real determiner of the antecedent although it does not appear right after the head noun.

I would hypothesize that the first element is a marker that indicates that the head is modified by a clause, rather than by single word like an adjective or a possessive, and that the second element is the corresponding determiner of the antecedent, which presents a special form for the indefinite use, namely *čha* instead of *waŋ*, perhaps to avoid the coincidence with the first element *waŋ*:

(3) *Htálehaŋ mnípiga waŋ wóyute mas'óphiye kiŋ ektá ophé- Ø-   wa-thuŋ čha*
yesterday beer one   supermarket the at STEM-3SG:OBJ-1SG:SUB-buy a
Ø-   bl- atké
3SG:OBJ-1SG:SUB-drink
'Yesterday I drank a beer that /which I bought at the supermarket.' (lit.
'Yesterday I drank a beer, the one that I bought at the supermarket.')

Thus, the head noun, relative clause and the determiner are grouped together into a complex NP that behaves like an ordinary NP: *wičhaša...kiŋ hé* "that man" in (1a) and *mnípiga…kiŋ* "the beer" in (2a) functioning as actor or undergoer respectively. Lakhota is a head-marking language and therefore their obligatory arguments are coded by bound morphemes on the verb, and these arguments may be correferential with independent NPs that behave like adjuncts. Hence the whole NP functions as any other obligatory argument of the predicate in the main clause and, therefore, it has a coreferential morpheme on the verb.

In sum, the relative clauses in Lakhota, just like in English, cannot appear by themselves, since they use several mechanisms to show their dependency with respect to the main clause: a special determiner accompanying the head noun indicating that it is modified by an embedded clause, the presence of the determiner of the antecedent at the end of the relative clause indicating the substantivization of a clause, and the embedding of the relative clause inside a NP functioning as an obligatory argument of the main verb.

In Cheyenne, relative clauses are also considered examples of dependent clauses. These dependent or subordinate clauses are always preceded by a special prefix that indicates the mode, just like in the rest of the dependent clauses in the Conjunct Order. The mode of the relative clauses in Cheyenne is called the participial mode and it is marked by the prefix *tsé-*, which functions like a relative pronoun but without showing agreement with the antecedent.

As for the position of the relative clause, in this language the subordinate clause comes after the noun it modifies, whether it modifies the subject or object:

(4) *Tá΄tó=hetane tsé-šéšetanovóoht-   o momòhtóxe'a'hestòtse é-ho'h- oho
ná'estse*
  that - man   CLM- sit and watch- (3-I)   television   (3)-have-(3-4)
a   mo'ehno'hāme
horse (OBV)
'That man who is watching TV has a horse.'
Main clause: *Tá΄tó=hetane é- ho'hoho na'éstse mo'ehno'hāme* (OBV) 'That man
has a horse.'
Subordinate clause: tsé-šéšetanovóoht-o momòhtóxe'a'hestòtse 'who is watching
TV'

(5) *Éšeēva   ná-man-   e pó'eho'hé'mahpe tsé-hohtova-mo tahpe'hohtóva-máhéo-ne*
     Yesterday (1)-drink (3-I)   beer   CLM-buy- (1-I)   supermarket -
LOC
    'I drank the beer which I bought at the supermarket yesterday.'
Main clause: *Éšeēva ná-man-e pó'eho'hé'mahpe* 'Yesterday I drank the beer.'
Subordinate clause: *tsé-hohtova-mo tahpe'hohtóva-máhéone* 'which I bought at
the supermarket'

The formation of relative clauses in Cheyenne is more similar to English than to Lakhota, because there is an element that introduces the relative clause and there is an antecedent, the head noun, which appears inside the outside of the main clause, that is to say, the relative clauses in both languages are externally-headed.

Cheyenne shares with Lakhota the feature that, given that both are head-marking languages, their predicates include morphemes coreferring with all the obligatory arguments in the clause. Consequently, in the relative clause there are verbal affixes that are coreferential with the head noun as well as with the rest of core arguments.

This element *tsé-* does not look like a traditional relative pronoun because it shows no agreement of any kind with the head noun. It is just a marker that indicates the Conjunct Order and a specific mode of the predicate, namely the Participial Mode. Thus, in contrast with the Lakhota elements that have a similar function to the English relative pronoun, this element *tsé-* is invariable and it will not change its form, for example, in order to adapt itself to the definiteness of the head noun. As this prefix *tsé-* does not agree with the antecedent, the subordinate verbal complex it precedes must always follow the antecedent in order to avoid confusion. Cheyenne does not use any article to mark that a noun is definite. However, if a noun is indefinite, this feature will be marked by the addition of the particle *na΄éstse,* whose function is the same as the indefinite article in English meaning "a" or the numeral "one". This particle will appear in front of the head noun:

(6) *Éšeēva   ná-man-   e na'éstse pó'eho'hé'mahpe tsé-hohtova-mo*
Yesterday (1)-drink (3-I)   a   beer   CLM-buy- (1-I)
tahpe'hohtóva-máhéo-ne
 supermarket -   LOC
 'Yesterday I drank a beer which I bought at the supermarket.'

Another characteristic of relative clauses in Cheyenne is that only the verb in the main clause shows full agreement, in terms of prefix and suffix, with their arguments, since it appears in the Independent Order; however, the verb in the dependent clause, as it is typical of the Conjunct Order, only marks agreement in the suffix.

Unlike in English and Lakhota, where the relative clauses cannot appear by themselves, in Cheyenne sometimes they can occur without head or antecedent:

(7) *Hetane tsé-néménéstse é-kàhaneotse* 'The man who is singing is tired.'

(8) *Tsé-néménéstse é-kàhaneotse* 'The one who is singing is tired.'

This does not mean that relative clauses in Cheyenne are completely independent. They can only appear by themselves when there is an appropriate context that provides enough information to specify which the antecedent is. Apart from this, these clauses also show some mechanisms, such as the existence of an element that behaves similarly to an English relative pronoun, and a suffix in the dependent verb that provides information that agrees with the person, number, animacy, obviation, and the syntactic function of the antecedent, to show their dependency in relation to the main clause.

Another important issue concerning relativization in a language is related to the NP accessibility, that is to say, the ability of an NP (usually the relative pronoun) in the relative clause to be coreferential with the antecedent. Keenan and Comrie (1972) claim that there is a hierarchy of accessibility that shows the increasing difficulty involved in processing relative clauses when the NP in the relative clause perform the following grammatical roles: subject > direct object > indirect object > object of a preposition > genitive > object of a comparative particle. This hierarchy states that if a language can relativize an NP functioning as X on the hierarchy, it will also relativize all NPs that perform a grammatical role higher than X. English is a very clear example of this because it has an element called relative pronoun that is coreferential with the head noun or antecedent. Furthermore, English allows any kind of NP to relativize, whatever grammatical role it plays in the relative clause.

However, Lakhota lacks relative pronouns, since its relative clauses include the antecedent. Lakhota relative clauses consist of a verb or verb plus its arguments, nominalized by a set of determiners but there is no relative pronoun. In head-marking languages the verbal complex is the focus of organization of clause-level grammar and it directly expresses all the semantic roles which NPs may take in the clause. The verbal complex alone may constitute a complete sentence, since it explicitly codes the semantic roles of all of its arguments, and sets up slots that may be filled by the pronominal markers and their coreferential full NPs as long as the latter meet the specifications coded by the former; in other words, the verb, through its affixes, specifies what kind of arguments there can be in a clause and the nouns must adapt to those requirements (person, number, animacy, semantic macrorole) and, consequently, these NPs agree with the verb, not vice versa. Thus the head noun fills the slot in the embedded verb and the whole relative sentence, nominalized by the article *kiŋ (he)*, fills the slot set up by the main verb. In languages with externally-headed relative clauses like English, the issue of NP accessibility is understood as the ability of an NP in the embedded clause to function as the NP coreferential with the head noun. However, in Lakhota, as its relative clauses are internally-headed, NP accessibility can only be analyzed if the concept is understood as the ability to relativize of an NP that corefers with a pronominal marker both in the embedded clause and the main clause. Thus, the slot in the relative clause that is occupied by a relative pronoun in English is here filled by the head noun. The notions ´subject´, ´direct object´ and ´indirect object´ apply to the direct core arguments in a clause filling the semantic slots coded in the verb. Thus, the first three categories on the hierarchy fill the semantic slots coded in the verb and are relativizable in Lakhota. Things are equally simple with the oblique NPs, although the slots we are dealing with here are not set up by the verb in the relative clause, but by postpositions or possessor NPs:

(9) *Hé   waŋ él Lakhótapi kiŋ wačhe-Ø- kiya-pi kiŋ He Sapa e-   Ø-   Ø- čiya-pi*

  mountain a on Lakhota the STEM-3:SUB-pray-PL the Black Hills STEM- 3:SUB-3SG:OBJ-call-PL

'The mountain on which the Lakhota pray is called Black Hills.'

The noun *hé* occupies a slot set up by the postposition *él* within the relative clause and, in turn, the whole relative clause fills up the slot coded in the matrix verb.

Likewise, possessed NPs are also accessible to relativization. This language forms a structure analogous to the possessive case in English formed by an apostrophe and "'s" by means of two consecutive NPs, the first one indicating the possessor and the second one being the possessed:

(10) *Wičhaša waŋ tha-šuŋkawakhaŋ kiŋ Ø-   t' á kiŋ lila čhaŋté-Ø-   šiça*

    man   a his- horse   the 3SG:SUB-die the very STEM-3SG:SUB-be sad

'The man whose horse died is very sad.'

Here there is a slot set up by the possessed noun and this slot is filled by the head noun *wičhaša*, whose specifier is the article *kiŋ* that appears after the possessed NP *tha-šuŋkawakhaŋ*. Likewise, the whole relative clause occupies the semantic slot in the matrix predicate.

Furthermore, it is also possible to relativize the antecedent, when it functions as the object of a comparative particle:

(11) *Wičhíŋčala waŋ Ø-   ísaŋm ni-   háŋske kiŋ líla Ø-   wašté*

    girl   a 3SG:OBJ-more 2SG:SUB-be tall the very 3SG:SUB-be good

'The girl you are taller than is very good.'

As for Cheyenne, in this language there is no relative pronoun either. The prefix *tsé-* introduces the relative clause that always follows the antecedent but it is invariable and there is no grammatical evidence to think that it is coreferential with the head. In the Independent Order, the prefix is an agreement marker, marking the person of one argument in the clause. In the Conjunct order, the prefix indicates the mode of the verb, that is, Indicative, Subjunctive, Participle or Iterative. The most common prefix is this particle *tsé-*, which is used with all conjunct verbs of the indicative or the participial mode, thus reflecting its multifunctional character:

(12) […] *tsé-   h - némen-ese*

    CLM-PAST-sing - (3)

    […] 'when he sang.'

(13) […] *tsé- némen-estse*

    CLM- sing- (3)

    […] 'the one who sings.'

In these two examples this particle *tsé-* appears functioning as a relative pronoun and as a conjunction respectively. If this particle only occurred with the participial mode, then it could be thought to be a relative pronoun that is coreferential with with any type of antecedent regardless of its animacy, person, or number, owing to its invariable form. Nevertheless, it is able to express a wide range of adverbial meanings because, as well as being an equivalent

expression for the English time adverb "when" like in (9), it can also appear preceding other preverbal particles as *tsé-heše- , tséx-homáʹxe- , tsé-heʹéše-* meaning "that" or "how", "because" and "while" respectively, which discards the possibility that this particle is a proper relative pronoun.

Cheyenne relative clauses are externally-headed and the concept of NP accessibility must be understood in the sense of a potential lexically unfilled NP position in the relative clause that is coreferential with the antecedent and also with a pronominal marker in the linked clause, which codes its specific grammatical role. Cheyenne shares with Lakhota the fact that both are head-marking languages where the verbal bound morphemes stand for the obligatory arguments of the predicate and, therefore, there is a slot in the relative clause which will be delimited grammatically in terms of person, number, animacy and function, but it will not be occupied by any lexical element either. Hence, the first three categories on the hierarchy, that is, the subject and the two objects, are relativizable. As for the oblique elements, they are also accessible to relativization. In this language, there are two kinds of elements in this language that express the same meanings as the English prepositions: preverbal particles and nominal suffixes.

Sometimes there are preverbal particles embedded into the verbal complex whose presence converts the oblique elements into direct core arguments required by the predicate. Consequently, to relativize these complements would be exactly the same as to do it with direct and indirect objects:

(14) *Kàsóhéso tsé-hehp-óʹèstàhem-òtse é-hohá-pèhevah- e*
        boy   CLM-more- be tall- (2-3) (3)-very-be good-(e)
        'The boy you are taller than is very good.'

Other times, there are some nominal suffixes that express adverbial meanings such as location and instrument and, consequently, this is an example that resembles the complementation of a prepositional object in English by a relative clause:

(15) *Hoʹhonáé(vose)-va   tsé-tsèhéstàhese é-háóén-áme   é-hestoh-   e*
        Moʹòhtʹvoʹhonáé-va
        mountain -LOC   Cheyennes   (3)-pray-(33) (3)-be called-(I) Black Hills- LOC
        'The mountain on which the Cheyennes pray is called Black Hills.'

The relative clause appears right after the antecedent, which in this case is a oblique element marked with the locative suffix *-va*.

Even after the possessive case it is also possible to relativize. Cheyenne forms the equivalent to the English saxon genitive structure analogously to Lakhota:

(16) *Hetane hé-moʹéhnoʹhāme é-naaʹ-óho é-áʹkavèstáh-á*
        man   his-horse (OBV) (3)-die- (4) (3)-be sad- (3)
        'The man whose horse died is very sad.'

Here the slot filled by the head noun is specified by the possessed noun and the embedded clause functions as a modifier of the head in main clause.

3. Nexus-juncture types in relative clauses

Relative clauses can present two different levels of juncture: NP and nuclear, resulting in two nexus types, nuclear subordination and NP subordination. English relative clauses are externally-headed and they illustrate each of these two different linkage types because this language has two different types of relative clauses, that is, defining relative clauses and non-defining relative constructions, each showing one of the two types of juncture-nexus types mentioned.

Lakhota only exhibits one of these two kinds of relative clauses, the definining/restrictive relative type. These relative clauses are internally-headed and, consequently, they are indeed a complex NP containing a (relative) clause that functions as an argument of the matrix predicate:

(17) *Mithákhola wašíčuŋ waŋ thatháŋka kiŋ hená Ø- wičha- kté kiŋ Ø- Ø-khiyúše yelo*
My-friend whiteman a buffalo the those 3SG:SUB-3PL:OBJ-kill the 3SG:SUB-3SG:OBJ-hate DECL 'My friend hates the man who killed those buffalos.'
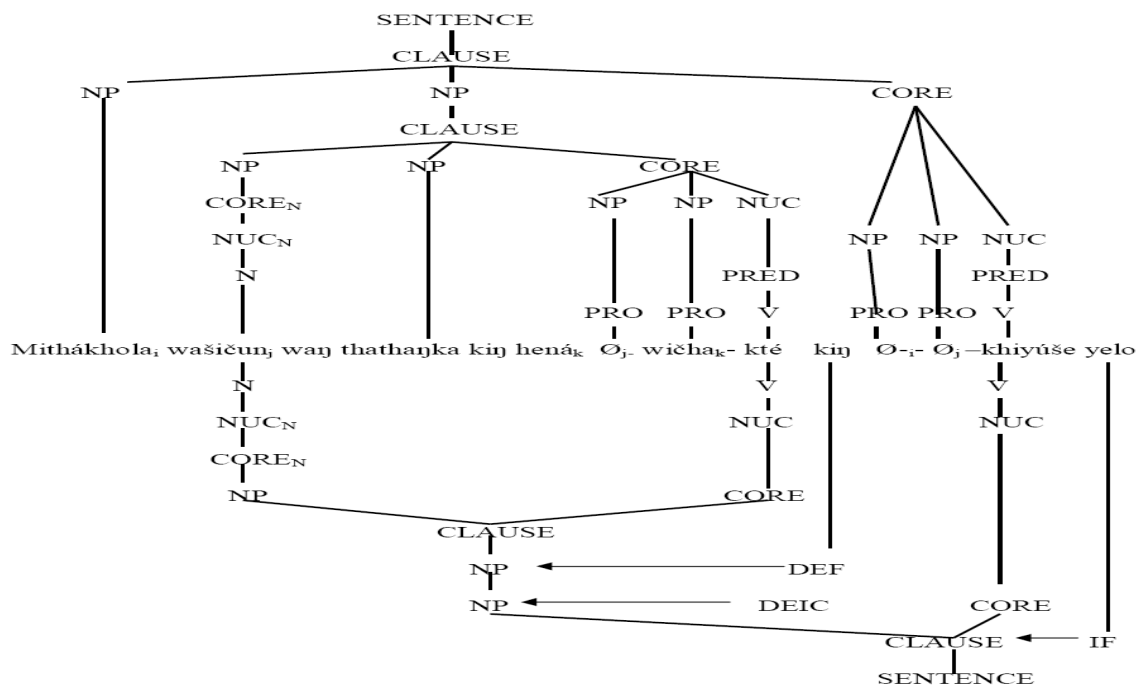

Figure 1: Defining / restrictive relative clause in Lakhota.

The fact that Lakhota relative clauses are internally headed is clearly observed above, because the noun representing the entity to be modified by the relative clause (the head noun[1]) is within this embedded clause. Lakhota presents a complex problem when representing the LS in a relative clause for two reasons: it is a head-marking language and its relative clauses are internally-headed. Apart from the fact that each argument position is filled by a pronominal element and may also be optionally filled by a full NP as well, it is necessary to represent the second argument of the main predicate *khiyúše* "hate" in the form of a whole NP, which contains a relative clause and where the head noun is a core argument of the subordinate predicate *kté* "kill". It is also necessary to include the NP operators for the head noun, since they are an obligatory part of its coding. A very important feature is that the first

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[1] For the sake of clarity, only the NP containing the head noun has been analyzed in depth.

argument in the attributive LS appears lexically unfilled, because only the pronominal argument occurs in the matrix clause, since the optional NP appears in the linked clause. The definiteness value of the NP is coded in the NP operators which modify the attributive LS containing the representation of the relative clause, because the definiteness value of the head noun is formally realized by the article *kiŋ*:

(18) *Mithákhola wašičun waŋ thathaŋka kiŋ hená wičhakté kiŋ khiyúše yelo*
　　　'My friend hates the man who killed those buffalos.'
　　LS:　　**hate´**(3sg[mithákhola], $<_{DEF}$ + $<_{DEI}$ Ø $<_{NUM}$ SG
[**be´**(3sg[x]$_i$,[**do´**(3sg[wašičuŋ]$_i$, Ø)] CAUSE [BECOME **dead´**(3pl[thathaŋka kiŋ hená]$_j$)])])

In order to establish the relationship between the two LSs, that is, between the LS of the matrix and the linked clauses, coindexing is crucial: the first argument in the attributive logical structure must be coindexed with an argument in the embedded LS, which, in this example, functions as the actor of the subordinate clause. The whole attributive LS then fills the matrix verb logical structure argument variable, in this case the argument functioning as the undergoer.
　　In Cheyenne there is also only one type of relative clause, namely, defining/restrictive relative clause but, unlike Lakhota, the relative clause in this language is externally-headed and, consequently, this construction illustrates an instance of nuclear subordination:

(19)　*Néséne é-péót- óho vé´hó´e　　　tsé-na´h-ótsese néhe hotoa´o*
　　　my friend (3)-hate-(3-4) whiteman (OBV) CLM-kill- (4-5) those buffalo
(OBV)

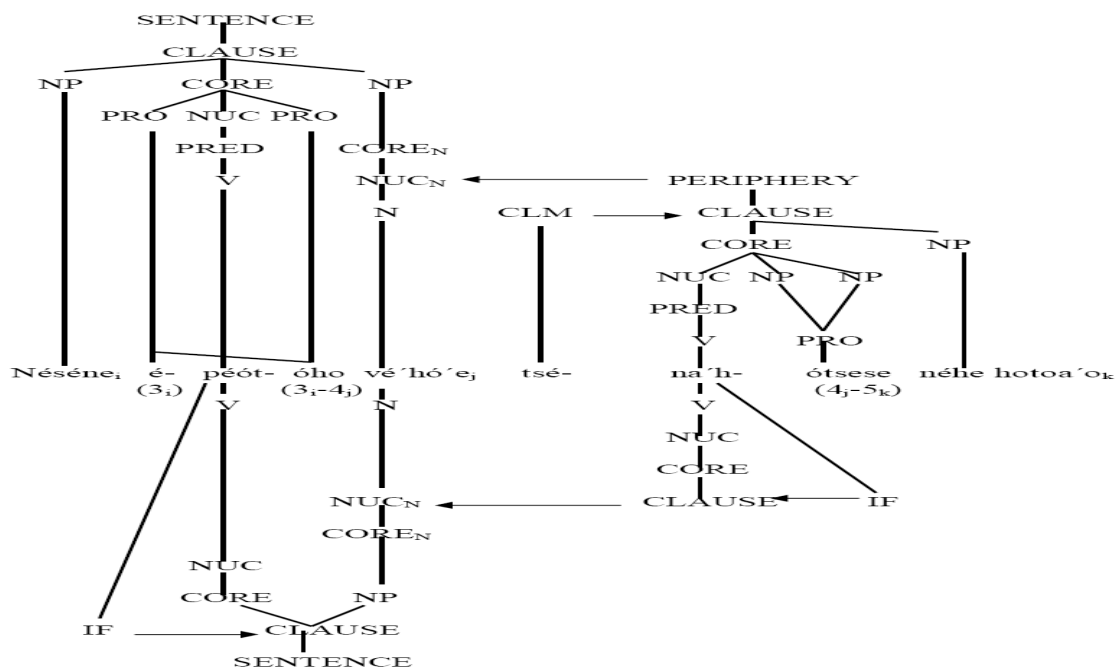　　　'My friend hates the man who killed those buffalos.'

Figure 2: Defining / restrictive relative clause in Cheyenne.

Relative clauses in Cheyenne are externally headed relative clauses and therefore their head is outside the relative clause. The most outstanding feature of externally-headed relative clauses is that the core template in the subordinate clause lacks a core argument position, the

one corresponding to the head noun. This fact entails that the number of syntactic slots for arguments within the linked core is reduced by one, provided that the head noun is a semantic argument of the predicate, since it is always outside the relative clause. However, nothing needs to be said regarding cases in which the head noun is not an argument of the verb in the relative clause, because peripheral constituents are always optional in the syntactic templates and therefore the relative clause lacks no core argument position. The syntactic template selection principle is then revised in order to adapt the relative clauses to the template.

The representation of the LS for an externally-headed relative clause raises an important problem, since it is necessary to introduce a complex attributive logical structure into the argument position occupied by the head noun, with the head noun functioning as its first argument, and the LS of the verb in the relative clause filling the "pred′" slot in it. Then there will be an unlinked argument position in the semantics once all of the NPs in the clause have been linked. This position is filled in English by the relative pronoun, an element corefering with the head. A possible candidate for this position in Cheyenne seems to be the invariable prefix *tsé-*, which introduces the relative clause and appears right after the head noun like in English. However, although this multifunctional prefix behaves like a relative pronoun, it is in fact a CLM and therefore it will occupy the CLM position instead of the position of this unlinked argument. This unlinked argument position will not be filled lexically but it will not be left empty either: instead, it will be filled by grammatical information provided by the linked core suffix *–ótsese*, which signals that the head noun corefers with a fourth person participant that functions as the actor of the predicate of the embedded clause. Thus, the head must coindex with this position, in order to satisfy the completeness constraint:

(20) *Néséne   é-péótóho vé´hó´e tsé-na´hótsese néhe hotoa´o*
       'My friend hates the man who killed those buffalos.'
       LS: **hate´**(3sg[néséne], [**be´**(4sg[vé´hó´e]$_i$,[**do´**(4sg[x]$_i$,Ø)] CAUSE [BECOME **dead´**(5pl[néhe hotoa´o]$_j$)])])

The relationship between the two main logical structures is also expressed by the coindexing required. In order to integrate the two logical structures, the first argument in the attributive logical structure must be coindexed with the argument in the embedded logical structure containing the relative pronoun. However, owing to the lack of relative pronoun in this language, a variable will fill the slot in the LS of the relative clause and will be coreferential with the head. Likewise, the whole attributive logical structure then fills the argument position in the LS of the matrix core which is coindexed with the relative pronoun.

4. Linking in complex noun phrases (relative clauses)

The goal of linking in complex NPs, relative clauses in particular, is the linking of the head noun to both the matrix clause and the relative clause. The different steps (Van Valin and LaPolla, 1997: 518-20) which are carried out in the linking process for complex sentences in both directions, from semantics to syntax and from syntax to semantics, are summarized below:

LINKING ALGORITHM: SEMANTICS → SYNTAX

1) Construct the semantic representation of the sentence, based on the logical structure of the predicates.
2) Determine the actor and undergoer roles, following the AUH.
3) Determine the morphosyntactic coding of the arguments (PSA, case marking).
4) Assign the core arguments the appropriate case markers/adpositions and assign the predicate the appropriate agreement markers.
5) Select the syntactic template and assign arguments to positions in the syntactic representation.

Figure 3: Steps of the semantics-to-syntax linking algorithm for complex sentences.

LINKING ALGORITHM: SYNTAX → SEMANTICS

1) Determine the functions of the core arguments, the PSA and alignment features (accusative, ergative or split-S).
2) Retrieve from the lexicon the logical structure of the predicate and with respect to it determine the actor and undergoer assignments, following the AUH.
3) Link the arguments determined in step 1 with the arguments determined in step 2 until all core arguments are linked.
4) If there is a predicative adpositional adjunct, then retrieve its logical structure from the lexicon, insert the logical structure of the core as the second argument in the logical structure and the object of the adposition as the first argument.
5) In case there is a PrCs or PoCs element, assign it to the remaining unlinked position in the semantic representation.

Figure 4: Steps of the semantics-to-syntax linking algorithm for complex sentences.

The two different types of relative clauses, e.g. head-external, as in English and Cheyenne, and head-internal, as in Lakhota, present a different linking problem. With head-external relative clauses, the syntactic template selection principle is altered because when the head noun is an argument, there is a reduction of one syntactic slot in the linked core. In head-marking languages this occurs only lexically but not grammatically, owing to the fact that the arguments are always realized by pronominal markers, rather than by full NPs. Furthermore, this type of relative clauses presents the problem of determining the function of the head in the embedded clause. The problem with head-internal relative clauses, in contrast, is determining which argument in the relative clause also functions in the matrix clause. In English there are two types of head-external relative clauses: those which have a relative pronoun ("who(m), which, that, whose"), and those which have no relative pronoun and a gap in the relative clause. The only restriction that English has on this construction is that if the head noun is the privileged syntactic argument of the relative clause, then the relative pronoun is obligatory; otherwise it is optional. In Lakhota, the relative clauses are head-internal and there is no relative pronoun. Finally, Cheyenne has externally-headed relative clauses but with no relative pronoun.

Restrictive relative clauses are attributive modifiers, and accordingly they will be represented in an attributive logical structure, **be´**(x, [**pred´**]), with the logical structure of the relative clause filling the second slot in the attributive logical structure. While this is not a control construction, the same mechanism may be used for representing the function of the head noun within the logical structure of the relative clause: the head noun is coindexed with either a lexically unfilled variable in the LS of the verb in the relative clause in the case of Cheyenne or with the lexically unfilled variable in the first slot of the attributive logical structure:

(21)   a.   Lakhota:
  Peter wiŋyaŋ waŋ wakhaŋheza kiŋ nuŋwé-Ø-   Ø- khiye kiŋ waŋ-Ø- Ø-yaŋke
  woman a   child   the STEM- 3SG:SUB-3SG:OBJ-wash the STEM-3SG:SUB-3SG:OBJ-see

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LS: **see´**(3sg[Peter], $<_{DEF}$ + $_{DEI}$ Ø $_{NUM}$ SG [**be´**(3sg[x]$_i$, [**do´**(3sg[<u>wiŋyaŋ</u>]$_i$, [**wash´**(3sg[wiŋyaŋ]$_i$, 3sg[wakhaŋheza])])])])

b. Cheyenne:
   Peter é-voom-óho he'(é)- óho   tsé-néše'han-ótsese ka'ėškóne-ho
       (3)-see- (3-4) woman (OBV) CLM-wash-   (4-5)   child (OBV)
   LS: **see´**(3sg[Peter], [**be´**(4sg[<u>he'é</u>]$_i$, [**do´**(4sg[x]$_i$, [**wash´**(4sg[x]$_i$, 5sg[ka'ėškóne])])])])

c.   English:
   Peter saw the woman that washed the child.
   LS: **see´**(Peter, [**be´**(<u>woman</u>$_i$, [**do´**(that$_i$, [**wash´**(that$_i$, child)])])])

The LS in Lakhota shows that the second argument position of the matrix core is filled by a complex NP containing the relative clause. In the first position of the attributive logical structure there is no lexical element because the antecedent in Lakhota is internal and appears inside the relative clause itself. Both in English and Cheyenne the antecedent is external and occupies the first position of the attributive logical structure, thereby heading the second position of the LS of the matrix core. The antecedent in Lakhota *winyan kiŋ* functions as the undergoer of the matrix core and, as the actor of the embedded core, thereby occupies the first position in the linked LS. Although in Cheyenne there is no relative pronoun as in English, the actor position of the linked core is perfectly clarified by the grammatical information provided by the verbal morphemes, which corefer with the corresponding NPs. The undergoer of the main core *he'é* is also the actor of the subordinate core, which is reflected by its positioning in the first slot in the linked LS.

Next, one example of the linking algorithm process will be provided for each language:

Lakhota:

(22) *Misúŋka wówapi waŋ Deloria   o-   Ø-   Ø-   wa kiŋ lé wašté- Ø- Ø- lake yelo*
my-brother book   a   STEM-3SG:SUB-3SG:OBJ-write the this STEM-3SG: SUB- 3SG:OBJ-like DECL
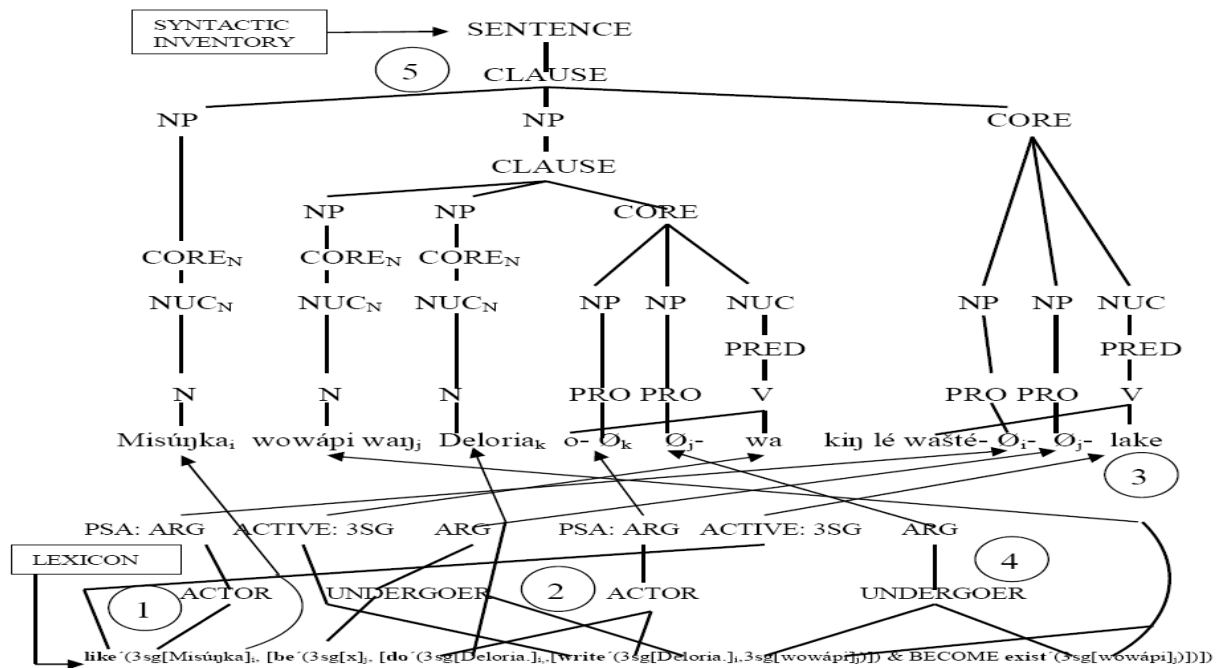'My brother liked this book that Deloria wrote.'

Figure 5: Semantics-to-syntax linking in the Lakhota nuclear juncture defining relative clause.

Lakhota relative clauses are indeed complex NPs containing a (defining/restrictive) relative clause, where the head noun is found. Despite the fact that Lakhota does not have an external head noun, the pronominal markers included in the core makes it easy to identify which is the element that is complemented by a relative clause. In this case, the head noun is a third person singular argument that must be coindexed with the noun *wowápi*, which is marked as the head noun of a relative clause by the determiner *waŋ*. In turn, the NP containing the head noun, that is, *wowápi kiŋ*, functions as the undergoer of the subordinate predicate.
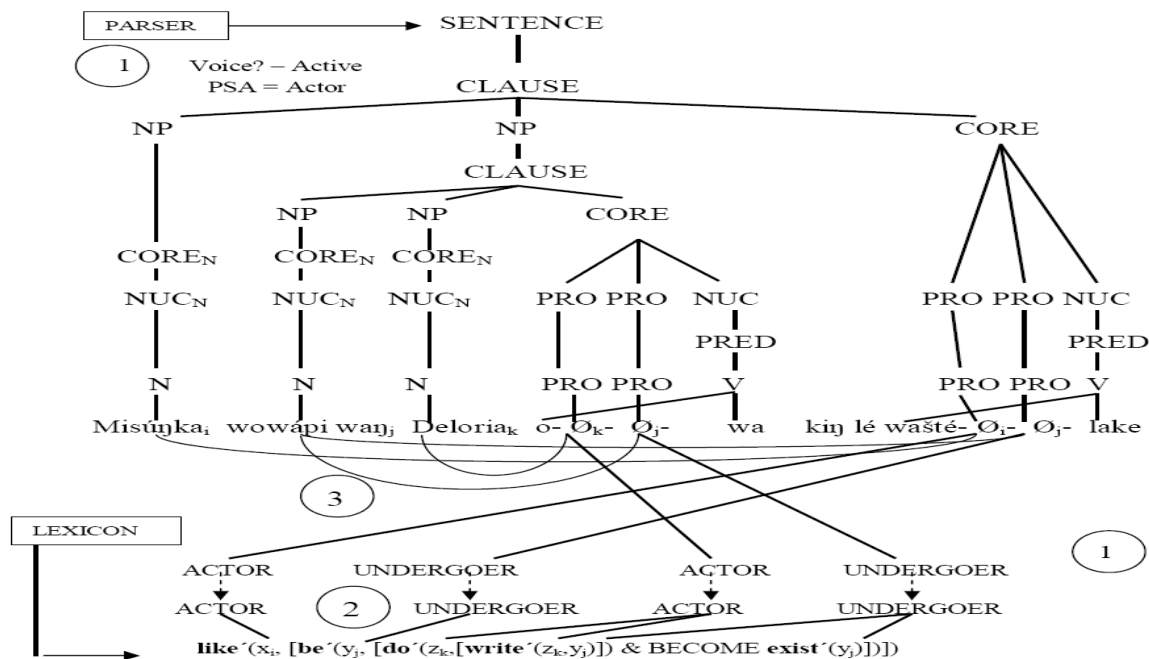

Figure 6: Syntax-to-semantics linking in the Lakhota nuclear juncture defining relative clauses.

The main difficulty that may arise when undertaking the syntax-to-semantics linking in a Lakhota relative clause is to identify the function of the head noun. It is clear that the head

noun is the first element in the relative clause, it is always accompanied by *waŋ* or *eyá* and it must agree in person, number, and animacy with one of the pronominal markers of the embedded core. Here the problem lies in the fact that there are three possible head nouns, one after the other, since all of them could agree with the grammatical information denoted by the bound markers: third person singular animate or inanimate. The clearest evidence to identify the head noun is provided by the fact that only one of these three NPs is followed by *waŋ*. As for the function it plays in the matrix core, there is further evidence to support the view that only *wowápi* can be the head noun: the canonical order in Lakhota is SOV and so *misúŋka* must be the actor of the matrix core, and the second element, in this case *wowápi…kiŋ* must be the undergoer of the matrix core. The major problem concerns the function it has in the embedded core. As the antecedent is the first element in the relative clause, word order does not help us to decide its function. In this example, the syntactic information expressed by the pronominal markers is not enlightening because there are two third person singular null markers and the two NPs concord with these features. However, according to the semantic meaning denoted by the predicate *owa* "write", it is obvious that the actor must be the animate participant and the undergoer the inanimate one.

Cheyenne:

(23) *Ná-htatánéme é-pehéva'tsést-a mòxe´éstoo'o tsé-mòxe'oha- otsese Deloria-evaho*
     my brother   (3)- like-   (3-I) book   CLM- write- (4-I)   (OBV)
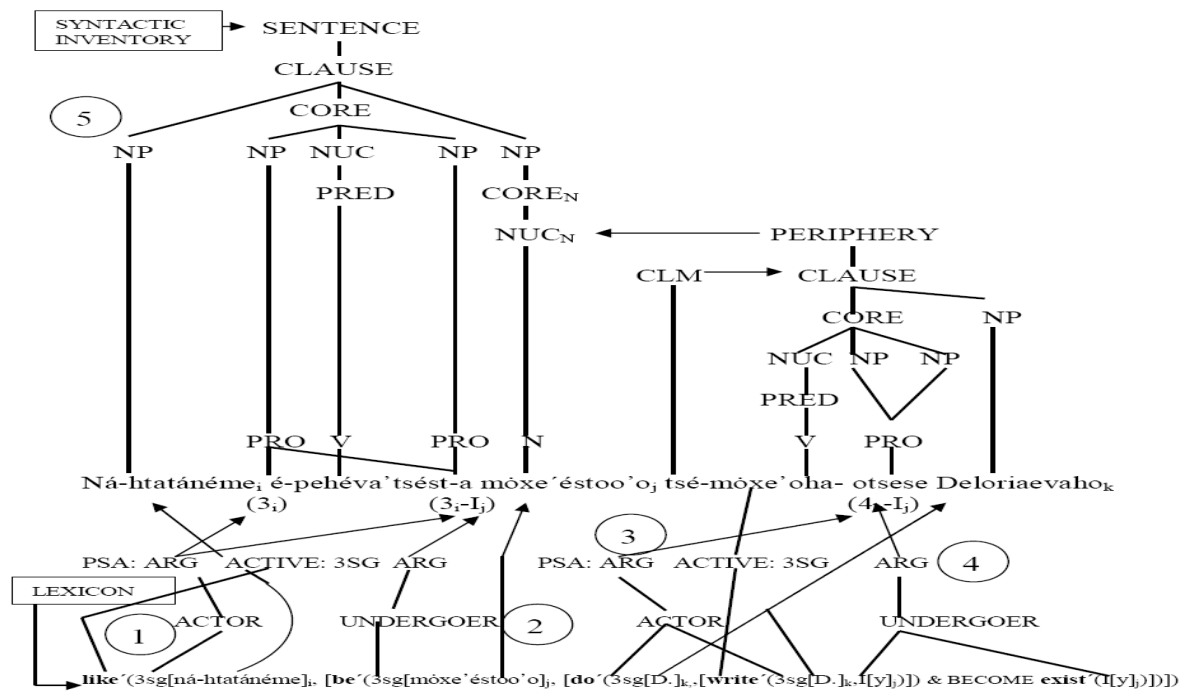   'My brother liked the book which Deloria wrote.'

Figure 7: Semantics to syntax linking in the Cheyenne nuclear juncture defining relative clauses

Cheyenne relative clauses are examples of nuclear subordination, the embedded clauses specify the antecedent and they are situated in the periphery of the nucleus. This language shares with English the feature that their antecedents are external and it shares with Lakhota the characteristic that they have no relative pronoun. Despite not having a relative pronoun, the verbal affixes give enough information on what the antecedent is like and, although this is not lexically realized, its grammatical features are specified. Given that this language owns a

rich verbal morphology in terms of affixes, it is very easy to recognize which the antecedent is and what its syntactic functions are, both in the matrix core and the linked core. In this example, it is evident that the inanimate participant functions as undergoer in both cores and the only inanimate referent is *mòxe'éstoo'o* "book". As it only appears in the matrix core and there is no relative pronoun-like word that replaces the head, there is a variable lacking lexical content in the corresponding slot in the subordinate clause.
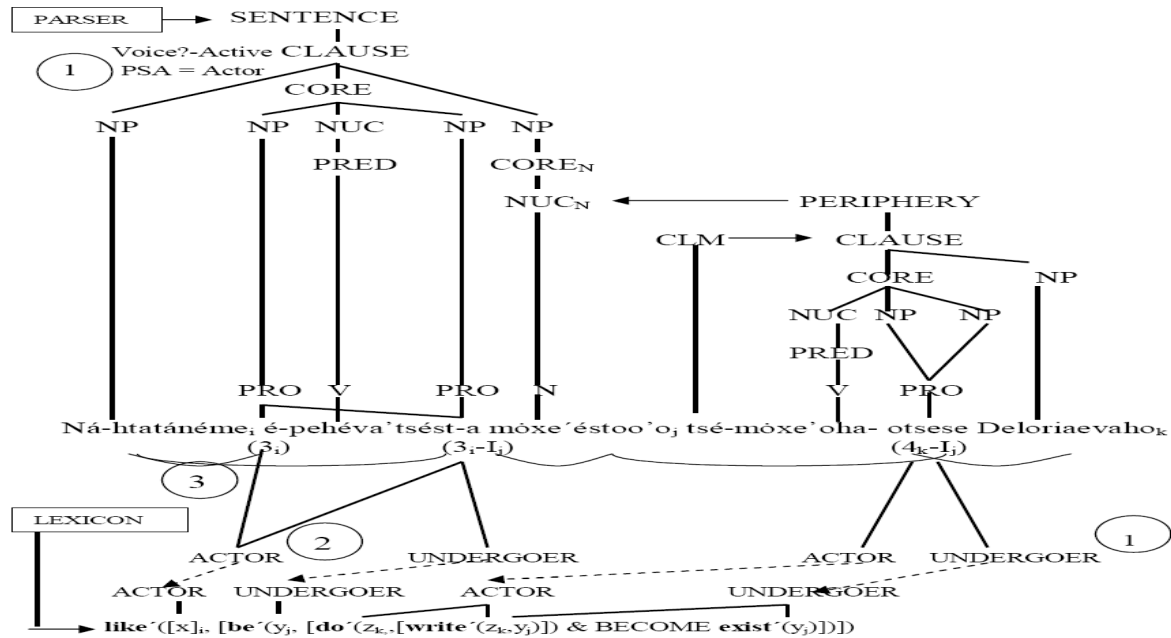

Figure 8: Syntax to semantics linking in the Cheyenne nuclear juncture defining relative clauses.

No problem arises when the syntax-to-semantics linking process is executed. Thanks to the verbal affixes, it is possible to know the antecedent and its function without any difficulty. The head *mòxe'éstoo'o* is the undergoer of the matrix core and also in the embedded core as the verbal suffix signal unequivocally.

In sum, the two most important factors that affect the linking algorithm of a relative clause are the type of antecedent and the presence or absence of a relative pronoun. These two factors seem to have bearing on the morphosyntactic parameters of a language. Thus, the fact that a language has externally- or internally-headed relative clauses is closely related to the word order, since verb-final languages seem to possess internally-headed relative clauses. As for the second factor, the existence of a relative pronoun seems to be linked to the argument type and marking parameters of a language, since Lakhota and Cheyenne, which are head-marking languages, have no relative pronoun, but English, which is dependent-marking does have relative pronouns. This fact seems to be due the presence of bound morphemes on the verb that realize the obligatory arguments and therefore there is no need to include a word like a relative pronoun that replaces the head in the embedded clause.

5. Conclusion

In this paper I have illustrated a central issue of RRG, which is to establish a relationship between syntax and semantics in order to study different languages and find similar characteristics however different they are. I have done this by showing it is possible to represent relative clauses similarly in two languages, Lakhota and Cheyenne, which behave very differently in their formation of these clauses.

Most of the differences have bearing on two syntactic factors, namely: the position of the antecedent and the presence or absence of a nominal element in the relative clause coreferential with the antecedent. Both languages allow any NP to relativize although those NPs that function as a direct core argument show more propensity to relativization than those that are oblique elements. The major difference lies in the fact that Cheyenne relative clauses, which are head-external, are considered subordinate clauses in the periphery of the nucleus and, by contrast, Lakhota relative clauses, which are head-internal, show a linkage between an NP and a clause, all of it constituting essentially a complex NP.

The fact that semantics plays such a crucial role in this theory can be observed in that, despite the formal differences between these constructions in these two languages, as the function these constructions play in every language (to describe or identify the referent of a head noun that has been already mentioned formerly), is basically the same, their syntactic representations do not turn out to be very different. Although this article only concerns relative clauses, I have also checked the capacity of this theory to analyze similarly other complex constructions, such as adverbial or nominal clauses, in these two languages. Thus, RRG allows us to develop the linking process in relative clauses in Lakhota and Cheyenne (as well as in any other language) analogously.

6. References

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