Morphology in the 'Wrong' Place: The Curious Case of Coast Tsimshian Connectives

Douglas Ball

Truman State University

Abstract

This paper examines the apparently odd location of case-marking formatives found in the Pacific Northwest language, Coast Tsimshian. It first argues that the case-marking formatives are actually affixes on the preceding words, not prosodically-dependent words. Given this morphological analysis, a syntactic analysis is proposed that utilizes the 'informationally-rich' syntactic structure of HPSG. In particular, the analysis proposed uses EDGE features and chained identities between adjacent phrasal sisters to license the clause. This enables a simple analysis of the clausal syntax of Coast Tsimshian while still accounting for the wide array of facts surrounding the connectives.

1   Introduction

Coast Tsimshian, also known as Sm'algyax, is an indigenous language of the Pacific Northwest, spoken in northwestern part of the Canadian province of British Columbia and in the extreme southeast of part of the American state of Alaska.[1] This language generally exhibits (AUX)–V–Argument(s) order in clauses and shows ergative alignment in both pronominal and non-pronominal expressions (Mulder, 1994).[2] Facilitating the interface between these word order and alignment patterns are the class of formatives that Tsimshianists have called 'connectives'. Examples of the connectives and the ergative alignment are given in (1) and (2), where the connectives of have been bolded:

(1)   Yagwa hadiksa   üüla.
        Yagwa hadiks-[**a**   üüla]
        CONT   swim-[ABS.CN seal]
        'The seal is swimming.'   (Mulder, 1994, 32)

Abbreviations used include: ABS/*abs* = absolutive; ACC = accusative; ADJ = adjunct; *adj* = adjective; Args = arguments; ARG-ST = argument structure; AUX/*aux* = auxiliary; CONT = continuous (aspect); CTRST.FOC = contrastive focus; *cxt* = construct; C-M = case marking; DEM = demonstrative; ERG/*erg* = ergative; FUT = future; *hd* = head(ed); HFP = Head Feature Principle; INST = instrumental; L = left; MRKD-IND = marked index; NEG = negative; PL = plural; POSS = possessive; PST = past; *sai-ph* = subject-auxiliary-inversion phrase; SEM = semantics; SYN = syntax; TOP = 'topicalized'; V = Verb; VAL = valence.

Notable or unusual aspects of Coast Tsimshian orthography are as follows: {'*X*}= any glottalized sonorant, {*X*'} = ejectives, {ł} = [ɬ], {ḳ} = [q], {g̱} = [ɢ], {kw} = [kʷ], {gw} = [gʷ], {ky} = [kʲ], {gy} = [gʲ], {x} = [χ], {ü} = [ɯ], {ẅ} = [ɰ], {y} = [j], {a} = [æ], {a̱}= [ɑ] or [ʌ], {o}= [o] or [ɔ], {VV} = [V:]

[1]It is critically endangered (Moseley, 2010); numbers of speakers number is no more than a few hundred, if that. Coast Tsimshian is a member of the small Tsimshianic family, including Southern Tsimshian [Sgüüxs], Nisgha [Nisga'a], and Gitksan [Gitxsan] (Mulder, 1994, ch.1). The Tsimshianic family may be a part of the larger Penutian family (Tarpent, 1997).

[2]I gloss over some complexities of the alignment here as they are irrelevant to the point here, but see Mulder (1994, ch. 2) and Bach (2004) for some further discussion.

(2)   Yagwat   huumda   duusa   hoon.
        Yagwa-t   huum-[**da**   duus]-[**a**   hoon]
        CONT-3.ERG smell-[ERG.CN cat]-[ABS.CN fish]
        'The cat is sniffing the fish.'   (Mulder, 1994, 32)

Because their principal function is to signal the relationship of the following expression with its predicate, I will henceforth call these 'case connectives' (cf. Stebbins' (2003) term 'dependency markers') to clearly indicate that I am discussing these elements and not any of the other elements that are also traditionally considered connectives within Tsimshianic grammar. However, in addition to signaling case, they also signal information about the nominal expression that follows them (much as determiners do in other languages). The connectives used in the colloquial style just signal whether the following noun is a common noun or not. However, the connectives in the more complex narrative style further specify visibility to the speaker, beyond noun type and case (Mulder, 1994, 32–39).

As (1) and (2) indicate, the location of the case connectives is odd. They do not appear on the head noun that they semantically/functionally go with; i.e. the marking for the function of *duus* 'cat' is not on *duus* in (2). Additionally, it appears that the case connectives don't even occur within the constituent they mark. Again looking at (2), *duus*, despite being the site of marking for *hoon* 'fish', is not even within the same noun phrase as *hoon*.

The case connectives are also not misanalyzed head-marking pronominal affixes. Head-marking pronominal affixes independently exist in Coast Tsimshian; an example with them is given in (3), where the pronominal affixes are bolded:

(3)   Akadi-**t**   'nax'nuu-**t**.
        NEG.CTRST.FOC-3.ERG hear-3.ABS
        'They didn't hear it.'   (Stebbins, 2003, 402)

These *-t* morphs are mostly distinct in form from the case connectives; a list of extant forms is provided in (4):[3]

Forms of case connectives in Coast Tsimshian
-a, -s, -da, -sda, -ga, -sga, -tga, -at, -dat, -gat, -tgat, -as, -das, -dit

(4)

(Mulder, 1994, 33,39)

The connectives, additionally, are not confined just to verbs, but can appear on nouns as well, as illustrated by the marking on *duusa* 'cat.ABS.CN' in (2). Thus, it appears that this is, in fact, an instance of dependent-marking case marking.

However, the unusual location of the case connectives raises the question of what their grammatical status is: are they (perhaps prosodically-dependent) words,

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[3]The presence of *t*s and *d*s in (4) does raise the possibility that some of the case connectives have been mis-segmented and the *t* or *d* is actually not a part of the connective. Even if that is so, it would not affect the point here, as the remainder of the connectives are still distinct from the pronominal affixes. It is furthermore possible, if the case connectives and the pronominal affixes both have historical sources from determiners/pronouns, that the similarities between them are due to diachronic factors.

affixes, or some kind of clitic (assuming that the definition(s) for clitic status are clear)? And furthermore, how do these grammatical elements fit into the rest of the Coast Tsimshian clause? How is their location licensed and how is their function associated with the desired noun? To answer the former question, I argue that the connectives are, in fact, affixes on the elements that precede them. Section 4 will provide morphophonological evidence in support of this claim. Given this status within Coast Tsimshian grammar, in section 5, I sketch an analysis of the syntax of Coast Tsimshian clauses that both respects this morphophonological evidence yet handles the apparent 'bracketing paradoxes' that the morphophonology gives rise to. This analysis makes crucial use of EDGE features as well as a constructional constraint enforcing matching case and index values between adjacent clausal constituents.

2   The Distribution of Case Connectives

Before moving into a discussion of the analysis of Coast Tsimshian, let me first detail more of the distribution of these elements within clauses. It does appear that the connectives are obligatory: arguably, every core argument in Coast Tsimshian is marked by a connective (though there are some instances where the marking might be understood as covert, to be discussed in section 4.1). In terms of position, examples (1) and (2) showed that the case connective can appear immediately before the head noun that it relates to. However, this is not always the case. As shown in (5), the connective *-sga* and the head noun *awta* 'porcupine' are separated by two adjectives:

(5)   Ada ła dm   dzaksga   łgu gwe'am   awta.
       Ada ła dm   dzak-[**sga** łgu gwe'am   **awta**].
       And near.FUT die-ABS.CN little poor.ADJ.CN porcupine
       'And poor little porcupine was about to die.'   (Stebbins, 2003, 391)

Examples like (5) indicate the the connective is just required to appear before the *noun phrase* it marks. Since adjectives in Coast Tsimshian predominantly appear prenominally, they can separate a connective from its head noun.

The examples in (1), (2), and (5) also revealed that connectives can immediately follow both verbs and nouns. It may even be possible for them to appear on words from other lexical categories. A possible additional word category is the category that postverbal adverbial element *gada* of (6) belongs to:

(6)   Łat   'nisgatgit   gada   awtat   'niitga.
       Ła-t   'nisgatg-it   **gad-[a**   awta]-[t   'niitga].
       PST-3.ERG make.fun-3.ABS report-ERG.CN porcupine-ABS.CN 3SG

       'It is said that porcupine made fun of him.'   (Mulder, 1994, 175)

Observe in (6) that the connective (bolded and italicized) near the postverbal adverbial element (bolded) still occurs immediately before noun phrase that it marks

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(consisting of *awta-* here). Thus, it appears that as long as the postverbal adverbial is in the relevant place, the marking can appear on it.[4]

It does seem, however, that there is some controversy over the treatment of this particular adverbial element. In contrast to the segmentation that Mulder provides for (6), Stebbins (2003, 398) treats instances of the form *gad* as a verbal affix. However, Stebbins does not say why she does so. In the end, the analysis proposed in this paper is not greatly affected either by treating this element as a separate word or as an affix. For the sake of concreteness and presentation, I will continue to assume that *gad* is a separate word.

Finally, the behavior of the case connective system when there is a 'missing' or unrealized argument is also illuminating. Consider (7):

(7)   'Yagay 'wii gyisiyaasg-at in-t   [deentg-asga   łgu alasgm
      instead great northwind-3 TOP-3 avenge-ABS.CN little weak.ADJ.CN
      yetsisk].
      animal
      'Instead, it was the great northwind that avenged the little weak animal.'
      (Mulder, 1994, 35)

The key part of the (7) is the bracketed part, likely a subordinate clause within a larger cleft structure. The verb within this clause, *deentg-* 'avenge', has no locally-realized (i.e. a postverbal) ergative argument. The understood ergative of this verb is *gyisiyaasg-* 'northwind', which is realized before *deentg-* 'avenge'. Yet, *deentg-* does have a connective attached to it: an absolutive one, which signals the role of the next noun phrase over. Beyond reinforcing that the generalization that connectives just need to precede the relevant noun phrase, this datum shows that the actual postverbal argument—and not any more abstract representation of any argument—determines which connective appears after the verb.

The facts surrounding the Coast Tsimshian case connectives appear to be identical (or nearly so) to the slightly more well-known prenominal formatives of Kwak'wala (as first discussed by Boas et al. (1947) and discussed in the more theoretically-oriented literature by Anderson (1984, 2005) among others). The Kwak'wala elements, too, have the apparently odd property of appearing with the 'irrelevant' word that precedes them, but being relevant to the word or words that follow them. A Kwak'wala example is given in (8):[5]

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[4]Whether this pattern occurs more generally with other adverbials is difficult to know, because adverbial elements in Coast Tsimshian overwhelmingly tend to occur in locations that do not interact with the marking of arguments: preverbally—between the auxiliary and the main verb—or clause-finally (Stebbins, 2003, 391–392).
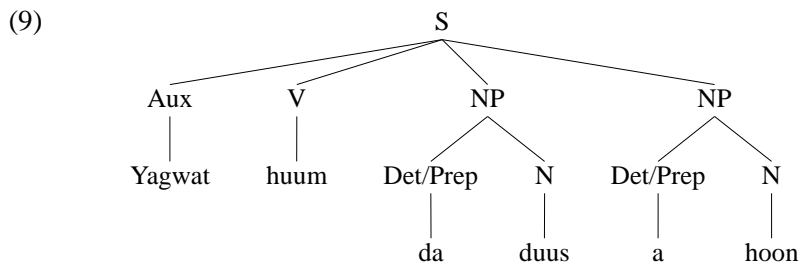
[5]The text in (8) does not use the original orthography, but has been converted to the U'mista orthography.

(8) Kwix'idida   bagwanamaxa   k'asasis   t'alwagayu.
     Kwix'id- ida bagwanama- x-   a k'asa- s-   is t'alwagayu.
     clubbed-   [the man]-   [ACC- the otter]- [INST- his club]

'The man clubbed the sea-otter with his club.'
(Boas et al., 1947, 282); (Anderson, 1984, 24)

The overlap in behavior in Kwak'wala and Coast Tsimshian is not surprising, since the two languages, though not genetically related, are geographically adjacent. This suggests that this property is an areal feature.[6] However, since the issue at hand has been discussed more for Kwak'wala than for Coast Tsimshian, I will use some of the analyses of Kwak'wala as a starting point for the analytical discussion.
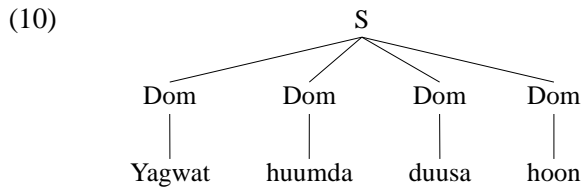
3   One Possible Analysis

The pre-NP location of the case connectives is similar to location of determiners or prepositions other languages. This overlap in distribution suggests that the connectives might be profitably analyzed as one of these elements—the precise choice will not matter—with a fairly normal combinatorics, but with an 'adjusted' phonology. Thus, there will be two representations associated with each sentence (which could be related in a number of different ways). For concreteness, a possible representation of the combinatorics for the Coast Tsimshian sentence in (2) would be as in (9):

(9)

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                        S
        ┌───────┬───────┴───────┬──────────┐
       Aux      V              NP          NP
        │       │           ┌───┴──┐    ┌───┴──┐
      Yagwat   huum     Det/Prep   N  Det/Prep  N
                           │       │     │      │
                          da     duus    a     hoon
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The key elements of the combinatorics are that the arguments of verbs are constituents and these constituents, in fact, include the connectives (such constituents appear as NPs in (9)). Furthermore, the verb combines with these nominal constituents in the ordinary fashion.

    The second representation would represent something more like the phonological constituency of a sentence. A possible representation of this sort of structure for the Coast Tsimshian sentence in (2) would be as in (10) (I neutrally call each constituent here Dom, short for domain):

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[6]However, there are also some similarities with the determiners in at least two Peruvian languages: Yagua, a Peba-Yaguan language of Peru (see Payne and Payne (1990) for primary data; Anderson (1993) for further discussion) and Chamicuro, an Arawakan language of Peru (see Parker (1999)). This suggests the issue discussed here is not merely confined to the Pacific Northwest.

(10)

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                              S
         ┌──────┬──────┴──────┬──────┐
        Dom    Dom           Dom    Dom
         │      │             │      │
       Yagwat huumda        duusa   hoon
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In contrast to (9), the connectives are attached to their hosts in (10). Thus, they are outside of the constituents that they are semantically relevant to in (10).

This style of analysis has been explored (somewhat implicitly) for Kwak'wala by Klavans (1985, 106–107) and in a slightly different instantiation by Anderson (2005, ch. 2 & 3).[7] Additionally, an analysis in this style could be implemented in HPSG using a linearization domains approach (see Reape (1994)). On such an approach, (9) would be the tectogrammatical representation (the combinatoric tree) while (10) would be the phenogrammatical representation (the linear syntax/prosodic representation) (see Curry (1961) for discussion of these terms and possible motivations for differentiating the kinds of representations).

Provided that a domain-based approach makes certain standard lexicalist assumptions, extending it to the Coast Tsimshian data would be problematic. The problem arises at the confluence of two assumptions. The first of these is that the smallest unit that both the tectogrammar and the phenogrammar manipulate is the word. This assumption offers a clear morphology-syntax interface and, if accurate, would provide an explanation for the cohesiveness of words (see Bresnan and Mchombo (1995) for discussion why this is important). The second of these assumptions is that there is some phonological processes that are sensitive to particular domains—most crucially for this work, the word and the phrase.[8] Furthermore, the boundaries relevant for the phonology are assumed to coincide with the boundaries of the syntax: this offers a clean syntax-phonology interface. So, on these assumptions, if the tectogrammar and phenogrammar only manipulate words, the boundary between case connectives and their hosts has to be a phrasal one. This predicts that only phrasal (postlexical) phonological processes should occur between case connectives and their hosts; this prediction is false in Coast Tsimshian, as the next section will show.

4   Case Connectives As Affixes

This section considers whether phonological and morphological behavior within Coast Tsimshian supports treating the sequence of word + case connective as a sin-

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[7]The analysis in Anderson (2005), however, does not suffer from the problems here because the connectives are forced to become part of prosodic words, capturing the lexical phonology-affects that I will discuss in the next section. However, this analytical move necessitates a weaker syntax-phonology interface than the one included in the analysis in section 5. Regrettably, space does not permit me a more in-depth comparison of the analyses.

[8]See Kiparsky (1982) for some discussion of why the distinction should be made. Note that this seems to be a common assumption made by quite a few phonologists; for example, it assumed by much Optimality Theoretic work, starting with Prince and Smolensky (2004).

gle word or as two parts of a larger phrase. The discussion, though not a straight-forward application of the tests for wordhood vs. clitichood proposed by Zwicky and Pullum (1983), is nevertheless in the spirit of Zwicky and Pullum's work. The discussion here heavily relies on and comes to the same sorts of conclusions as Stebbins (2003) (see in particular pp. 399–402 and 405–406) and Mulder (1994) (see in particular pp. 24–25).

I will argue that the morphophonological behavior supports treating connectives as a part of the word that also includes their host. The evidence principally comes from the behavior in two phonological phenomena—*a*-deletion and stem-final lenition—although some other areas provide additional relevant data. Although this section will discuss a certain amount of Coast Tsimshian phonology, the discussion intentionally will not be couched in a particular phonological framework. In fact, the only crucial assumption I will make about the phonology is that particular phonological phenomena are found only in certain domains, an assumption that could be incorporated in different ways with different frameworks.

4.1 *A*-Deletion

The first of several telling (morpho)phonological phenomenon that support the affixal status of case connectives is what I will call *a*-deletion.[9] In *a*-deletion, the *a* of the connectives *-a* and *-as* does not appear when the preceding phonetic environment includes a vowel, *l*, *m*, or *n*. This 'deletion' occurs in (11), where the absolutive connective *-a* would follow an *l*:

(11)   Gol   waab-s   Harry. (← *Gol-a waab-s Harry)
         tumble.down house-POSS.CN (name)
         'Harry's house tumbled down.'   (Stebbins, 2003, 396)

However, if one considers similar phonetic environments that span word boundaries, the 'deletion' is not found. An example of this is in (12), which has the same environment (bolded) as (11) should have:

(12)   Ada smgal **a**m-gooyginsg-it.
         And very   good-pastime-DEM
         'And [it is] a good pastime.'   (Mulder, 1994, 163)
         (Not *smgal mgooginsgit)

This difference in the domain of occurrence of *a*-deletion suggests that it can only occur within a word. (I do not know how general or restricted this deletion process may be within words, based on the data available to me.) With *a*-deletion being a word-internal phenomenon, we therefore must in turn conclude that the connectives are a part of the preceding word in order for the 'deletion' to occur.

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[9]In spite of the name I give it here, deletion may not be best analysis of this phenomenon.

4.2 Stem-Final Lenition

Another phonological phenomenon with similar results to *a*-deletion is what Stebbins (2003) calls stem-final lenition. In stem-final lenition, voiced stops appear in lieu of voiceless ones, when followed by a vowel. (In this subsection all alternating [or putatively alternating] stops will be bolded.) This phonological phenomenon occurs when the conditioning environment includes a suffix. One such example is the pronominal affix -*u* '1SG.ABS' in (13):

(13) /gɑ**p**-u/ → [gɑ**b**u]   (orthographic {g*a*bu})
      eat-1SG.ABS
      (Stebbins, 2003, 405)

Stem-final lenition also occurs when the conditioning vowel is part of a connective. This is exemplified in (14):

(14) /ɢɑ-nuːt**k**-æ/   → [ɢɑnuːt**g**æ]   (orthographic {ganuut*g*a})
      PL-dress.up-ABS.CN
      (Stebbins, 2003, 405)

Furthermore, stem-final lenition, like its name suggests, fails to apply across a word-boundary. This is illustrated in (15):

(15) /... gaik-**t**   ædæ-t   ... / → [gaik**t**ædæt]   (Mulder, 1994, 131)
          chest-3.POSS and-3.ERG

Since stem-final lenition does not occur across words, we have to conclude that this process is word-internal. Furthermore, since the case connectives are among the elements that condition this process, they must be word-internal as well. Thus, both *a*-deletion and stem-final lenition point to treating the case connectives as part of the word in order to have an accurate and uncomplicated analysis of the phonology.

4.3 Other Considerations

In addition to *a*-deletion and stem-final lenition, there are two other phonological phenomena that support the view that case connectives are contained within a word that includes their 'host'. The evidence these data provide is less strong than *a*-deletion and stem-final lenition because some of the details have yet to be fully elucidated, but still broadly support the same conclusion.

As Mulder (1994, 25) points out, when an *s*-final stem is followed by an *s*-initial connective, just one [s] surfaces. This is exemplified in (16):

(16) Baasga   sts'ool. (*baassga sts'ool)
      afraid.ABS.CN beaver
      'Beaver was afraid'   (Mulder, 1994, 25)

It appears that there are no instances of geminate [s] within words in Coast Tsimshian. If confirmed, this *s*-simplification process would be yet another word-internal phonological phenomenon that includes connectives, like stem-final lenition. If disconfirmed, *s*-simplification would be a morphologically-specific alternation, again supporting the affixal status of the connectives. If it turns out that geminate [s] is entirely absent from Coast Tsimshian—in both words *and* phrases—then this "de-gemination" phenomenon would have to be considered a general phonological phenomenon in Coast Tsimshian and, thus, not telling about which domain the connectives belong to.

Additionally, in environments that are not currently well-understood (though impressionistically, where a large number of consonants appear), an epenthetic vowel appears between the stem and connective, as illustrated in (17), with the epenthetic vowel bolded:

(17)   deentg-**a**sga   vs. ha'ligoot-*sga*
         avenge-ABS.CN   think-ABS.CN (Mulder, 1994, 35, 36)

As epenthesis is not reported in Coast Tsimshian between words, this would seem to be yet another word-internal phonological process. If it, in fact, is, this would be another example of a word-internal phonological phenomenon occurring due to the presence of a connective.

Finally, Dunn (1979, 131) reports that speakers always include the connective with its preceding word in pausing and hesitation phenomena. This mostly clearly supports the view that connectives group with the preceding material instead of the following material, as either affixes or as prosodically-deficient words. However, this patterning would have a very natural explanation if the connectives were affixes on the preceding word, since it is very common cross-linguistically to pause between words.

Overall, the boundary phenomena considered throughout this section strongly point to the the connectives being affixes on the words that precede them. While this conclusion may seem counterintuitive because it would make the case morphology appear outside the nominal unit that it, in some sense, goes with, the (morpho)phonological evidence nevertheless seems to strongly point towards this conclusion.

5   An EDGE-based Analysis

If we take, as a baseline, the view that the sequence Host + CaseConnective is one word that the phrasal syntax manipulates as a whole (as argued for in the previous section), the question remains how the clausal syntax of Coast Tsimshian should be accounted for. In particular, how can the apparent 'bracketing paradox' surrounding the connectives be resolved in order to license Coast Tsimshian clauses? The key idea behind the analysis presented here is that the case connectives might be viewed as a kind of edge-inflection; that is, the case connectives are affixes that

must appear within a word at the edge of some (syntactic) domain (this is a possible analysis of English possessive *'s*, for instance). This style of analysis has been pursued by some constraint-based grammarians, and in particular by members of the GPSG and HPSG community. In the GPSG and HPSG analyses the relevant feature has been called EDGE and it appeared in work by Nevis (1985); Zwicky (1987); Miller (1992); Halpern (1995); Tseng (2003, 2004); and Crysmann (2010).[10] This feature will also be a key component in the analysis of Coast Tsimshian data here.

However, because Coast Tsimshian case connectives are not realized within the constituent they mark, something more has to be said: merely adding the EDGE feature and allowing some elements to select for it is not sufficient for analyzing the Coast Tsimshian data. Thus, the analysis also includes a constructional (phrase-structural) element that will take information from the EDGE feature and ensure that it matches certain features of other expressions in the clause.

The analysis can broken down into a lexical part and a constructional part. The next two subsections will detail each in turn. I will then wrap up this section by explicating how the EDGE-based analysis that proposed here handles some of the more complex data noted in section 2.

5.1 Lexical Forms for Case Connective-Inflected Words

The grammar must have some means of licensing the connective-affixed words. I assume that this is accomplished through the following (general) lexical rule:[11]

$$
(18)\quad
\begin{bmatrix}
\textit{lexeme} \\
\text{FORM} \quad \langle\, \boxed{1}\, \rangle \\
\text{SEM} \quad X
\end{bmatrix}
\mapsto
\begin{bmatrix}
\textit{word} \\
\text{FORM} \quad \langle\, \text{F}_{casecon}(\boxed{1})\, \rangle \\[2pt]
\text{SYN}
\begin{bmatrix}
\text{HEAD} \qquad\qquad \textit{noun} \\
\text{EDGE}\,|\,\text{RIGHT}
\begin{bmatrix}
\text{CASE-MARKING} & \textit{case} \\
\text{MARKED-INDEX} & \textit{index}
\end{bmatrix}
\end{bmatrix} \\[2pt]
\text{SEM} \quad X \,\&\, Y
\end{bmatrix}
$$

The lexical rule in (18) accomplishes several key things. First, it specifies the appropriate morphological form of the word, via the morphological function I call $\text{F}_{casecon}$.[12] It also specifies the value of the word's EDGE feature. Because the locus of realization in Coast Tsimshian is at the right-edge of the word, the relevant feature path (following Tseng (2003)) is EDGE|RIGHT (henceforth abbreviated EDGE|R). The value of the CASE-MARKING feature (C-M) within the EDGE

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[10]Poser (1985) also includes a similar idea but his analysis pre-dates the EDGE feature as such.

[11]In the end, it is the resulting morphologically complex words and their feature structural specifications that are important, so this part of the analysis could be re-cast in any system that would allow for the desired 'outputs'.

[12]I assume that (18) is a generalized version of several specific lexical rules, so strictly speaking, there would not be one function $\text{F}_{casecon}$, but multiples ones for different case/noun/determiner combinations. Furthermore, for forms that have undergone '*a*-deletion', a portion of F_{abs} could be specified as the identity function to handle the apparent 'zero'.

feature is given generally as *case* in (18), but would, in fact, be a specific case value for a specific lexical rules. Finally, the lexical rule in (18) adds the appropriate determiner semantics (Y) to the semantic value of the word and readies the word to interact with other words to yield the desired linking of determiner and nominal semantics (via the MARKED-INDEX [MRKD-IND] feature, as will be seen).

So for the example word *duusa* 'cat.ABS.CN', the result of (18) will be (19):

(19)
$$\begin{bmatrix} word \\ \text{FORM} \quad \langle\ duusa\ \rangle \\ \text{SYN} \begin{bmatrix} \text{HEAD} \begin{bmatrix} noun \\ \text{CASE} \quad case \end{bmatrix} \\ \text{EDGE} \mid \text{R} \begin{bmatrix} \text{C-M} \quad\quad abs \\ \text{MRKD-IND} \quad y \end{bmatrix} \end{bmatrix} \\ \text{SEM} \quad cat'(x)\ \&\ the'(y) \end{bmatrix}$$

Because this word includes an absolutive connective, it is specified as EDGE|R|C-M *abs*. The added semantics (corresponding to Y of (18)) is the $the'(y)$. The y is also the value of MRKD-IND, which will ensure that the $the'(y)$ modifies the desired semantic entity.[13]

The lexical rule in (18) does not specific the value for the HEAD|CASE feature in (19) (the *case* value that appears in (19) is consistent with any specific case). However, this feature is included in (19) because it will ultimately play a role in the analysis. This CASE feature is covert; it is not directly inferred from the morphological form. However, having such a CASE feature facilitates the analysis in several ways. First, it leads to fairly ordinary verbal lexical entries (i.e. the verbs can select the case of their dependents as usual). Second, I believe it would facilitate an analysis of the 'raised' auxiliary-affixed ergative pronominals (whose analysis would take me outside the scope of this paper). Lastly, it enables a straightforward statement of the phrasal licensing of the noun phrases, a topic to which I now turn.

5.2 Licensing Phrases

In spite of the unusual location of the case morphology in Coast Tsimshian, a large portion of the phrasal side of the analysis will be quite ordinary, for a verb-initial language. The Coast Tsimshian clause (or a large subpart of it) will be combined using the general combinatoric construct I call the *head-all-valents-cxt*, given schematically in (20):[14]

---

[13]Likely the determiner semantics given here is too simplified, since it omits any scopal and contextual information. These elements could be easily added to present account once the requisite generalizations are understood.

[14]This combinatoric construction is identical, or nearly so, to a number of previous HPSG proposals: Schema 3 from Pollard and Sag (1994), *sai-ph* from Ginzburg and Sag (2000), and *aux-initial-cxt* from Sag (to appear))

(20)   (preliminary version)
head-all-valents-cxt $\Rightarrow$

$$\begin{bmatrix} \text{MTR} \mid \text{SYN} \mid \text{VAL} \quad \langle\ \rangle \\ \text{HD-DTR} \quad \boxed{1} \\ \text{DTRS} \qquad \left\langle \boxed{1}\Big[\text{VAL} \quad \langle \boxed{2}, \boxed{3}, ..., \boxed{n} \rangle\Big], \boxed{2}, \boxed{3}, ..., \boxed{n} \right\rangle \end{bmatrix}$$

The construction in (20) allows a head to combine with all its valents at once and will license the head-initial order found in Coast Tsimshian clauses, as well as the generally rigid order of the postverbal arguments. The 'flat structure' analysis embedded in (20) has been a common HPSG analysis of verb-initial languages since Borsley (1989, 1995) and without any obvious evidence for a more hierarchical structure in Coast Tsimshian, the analysis will not include any.

The *head-all-valents-cxt* in (20) will be treated as a subtype of *hd-cxt*, subjecting it to all the constraints on *hd-cxt*. The constraint of *hd-cxt* that is most central to this analysis is the Head Feature Principle, which requires all HEAD features to be shared between a mother and its head-daughter (see, for example, Sag to appear, 115). Furthermore, because this analysis includes EDGE features, something must be said about the permitted information sharing surrounding them. I assume the Edge Feature Principle of Tseng (2003, 327) to handle the structure sharing of EDGE features. Supposing that the Edge Feature Principle is a constraint on all phrasal constructs, this constraint has the form given in (21):

(21)

phrasal-cxt $\Rightarrow$

$$\begin{bmatrix} \text{MTR} \mid \text{SYN} \mid \text{EDGE} \quad \begin{bmatrix} \text{LEFT} \quad \boxed{1} \\ \text{RIGHT} \quad \boxed{2} \end{bmatrix} \\ \text{DTRS} \quad \left\langle \Big[\text{SYN} \mid \text{EDGE} \mid \text{L}\ \boxed{1}\Big], ..., \Big[\text{SYN} \mid \text{EDGE} \mid \text{R}\ \boxed{2}\Big] \right\rangle \end{bmatrix}$$

Intuitively, (21) requires that the mother's left and right EDGE feature values must match the same features on its leftmost and rightmost, respectively, daughters.

As explicated to this point, the *head-all-valents-cxt* only accounts for the simpler word order and valency facts in Coast Tsimshian. To license the immediate adjacency between the word with case morphology and the marked phrase or to establish the semantic binding between the determiner semantics of the connectives and the nominal semantics they go with, additional constraints need to be added. The *head-all-valents-cxt* with the requisite additional constraints is given in (22):[15]

---

[15]This same intuition as (22) could be implemented in a system with just binary-branching phrase structures. In such a case, the rule in (i) could be used recursively:

(i)

$$\begin{bmatrix} \text{VAL} \quad \boxed{A} \end{bmatrix} \rightarrow \mathbf{H}\begin{bmatrix} \text{EDGE} \mid \text{R} \quad \begin{bmatrix} \text{C-M} \quad \boxed{1} \\ \text{MRKD-IND} \quad \boxed{2} \end{bmatrix} \\ \text{VAL} \qquad \langle \boxed{3} \rangle \oplus \boxed{A} \end{bmatrix} \boxed{3}\begin{bmatrix} \text{CASE} \quad \boxed{1} \\ \text{IND} \quad \boxed{2} \end{bmatrix}$$

I chose the formulation in the text since there is no obvious evidence supporting a more articulated structure in Coast Tsimshian.

(22) (final version)

hd-all-valent-cxt $\Rightarrow$

$$\begin{bmatrix} \text{MTR} \mid \text{SYN} \mid \text{VAL} & \langle \; \rangle \\ \text{HD-DTR} & \boxed{0} \\ \\ \text{DTRS} & \left\langle \boxed{0}\begin{bmatrix} \text{EDGE} \mid \text{R} & \begin{bmatrix} \text{C-M} & \boxed{C_1} \\ \text{MRKD-IND} & \boxed{i_1} \end{bmatrix} \\ \text{VAL} & \langle \boxed{1}, \boxed{2}, ..., \boxed{m} \rangle \end{bmatrix}, \boxed{1}\begin{bmatrix} \text{HEAD} \mid \text{CASE} & \boxed{C_1} \\ \text{SEM} \mid \text{IND} & \boxed{i_1} \\ \text{EDGE} \mid \text{R} & \begin{bmatrix} \text{C-M} & \boxed{C_2} \\ \text{MRKD-IND} & \boxed{i_2} \end{bmatrix} \end{bmatrix}, ..., \boxed{n}\begin{bmatrix} \text{HEAD} \mid \text{CASE} & \boxed{C_n} \\ \text{SEM} \mid \text{IND} & \boxed{i_n} \\ \text{EDGE} \mid \text{R} & none \end{bmatrix}, ... \right\rangle \end{bmatrix}$$
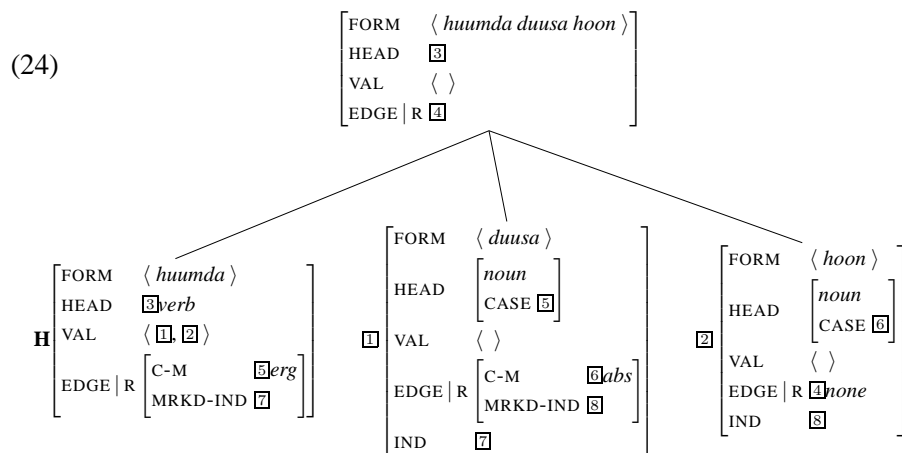
$(n \geq 2)$

As in (20), (22) still saturates all the valents of the head at once. However, it additionally has two sets of chains of constraints. The first deals with case and says, in essence, that the EDGE|R|C-M value must be identical with the HEAD|CASE value of the next daughter over for all the daughters in this construct. The second deals with semantic indices. It says that the EDGE|R|MRKD-IND value must be identical with the SEM|IND value of the next daughter over, again for all the daughters in the construct. Recall, in lexical descriptions of edge-marked words, the MRKD-IND value is equated with the index of the determiner in the semantic representation (as in (19)). With MRKD-IND value also being equated with the IND value of the next daughter over (per (22)), this will ensure that the desired nominal semantics is connected with the desired determiner semantics.

To see how (22) succinctly deals with the large collection of information that is relevant for licensing a Coast Tsimshian clause, let us consider an example. The lexical description of the verb in (23) could be the head-daughter of (22):

(23)

$$\begin{bmatrix} word \\ \text{FORM} & \langle \; huumda \; \rangle \\ \\ \text{SYN} & \begin{bmatrix} \text{HEAD} & verb \\ \text{VAL} & \left\langle \text{NP[HEAD} \mid \text{CASE } erg]_i, \text{NP[HEAD} \mid \text{CASE } abs]_j \right\rangle \\ \text{EDGE} \mid \text{R} & \begin{bmatrix} \text{C-M} & erg \\ \text{MRKD-IND} & i \end{bmatrix} \end{bmatrix} \\ \\ \text{SEM} & smell'(e, i, j) \; \& \; the'(i) \end{bmatrix}$$

Observe that (23) says nothing about the EDGE values of its valents (though it does specify the EDGE value of the word itself); the appropriate matching of morphological forms and feature values falls out from (22). The sisters of (23) are required, by the *head-all-valents-cxt*, to be identical to the verb's VAL list: thus, the above verb must have ergative and absolutive NPs as its sisters. The *hd-all-valents-cxt* also requires featural identity between the EDGE case-marking and the CASE value within adjacent pairs of elements on the DTRS list. So ultimately the chain of case constraints forces the CASE values in the lexical entry in (23) to have preceding expressions that are appropriately affixed.

Taking the entry in (23) and the constraints on the *head-all-valents-cxt* (including the HFP, (21), and (22)) gives the structure in (24), a structure of the relevant part of (2):

(24)

```
                          ⎡ FORM      ⟨ huumda duusa hoon ⟩ ⎤
                          ⎢ HEAD      3                      ⎥
                          ⎢ VAL       ⟨ ⟩                    ⎥
                          ⎣ EDGE | R  4                      ⎦
                         /            |            \
   ⎡ FORM     ⟨ huumda ⟩        ⎤   ⎡ FORM     ⟨ duusa ⟩           ⎤   ⎡ FORM     ⟨ hoon ⟩           ⎤
   ⎢ HEAD     3 verb            ⎥   ⎢ HEAD     ⎡ noun   ⎤          ⎥   ⎢ HEAD     ⎡ noun   ⎤         ⎥
 H ⎢ VAL      ⟨ 1, 2 ⟩          ⎥ 1 ⎢          ⎣ CASE 5 ⎦          ⎥ 2 ⎢          ⎣ CASE 6 ⎦         ⎥
   ⎢          ⎡ C-M       5 erg ⎤⎥   ⎢ VAL      ⟨ ⟩                 ⎥   ⎢ VAL      ⟨ ⟩                ⎥
   ⎢ EDGE | R ⎣ MRKD-IND  7     ⎦⎥   ⎢ EDGE | R ⎡ C-M      6 abs ⎤  ⎥   ⎢ EDGE | R  4 none           ⎥
   ⎣                            ⎦   ⎢          ⎣ MRKD-IND  8    ⎦  ⎥   ⎢ IND       8                ⎥
                                    ⎢ IND       7                  ⎥   ⎣                            ⎦
                                    ⎣                              ⎦
```

As indicated by 5, 6, 7, and 8 in the tree in (24), the three daughters in this instantiation of the *hd-all-valents-cxt* meet the chained adjacent constraints of (22)—all CASE-MARKING and MARKED-INDEX features are shared with the CASE and INDEX features, respectively, of the next daughter to the right.

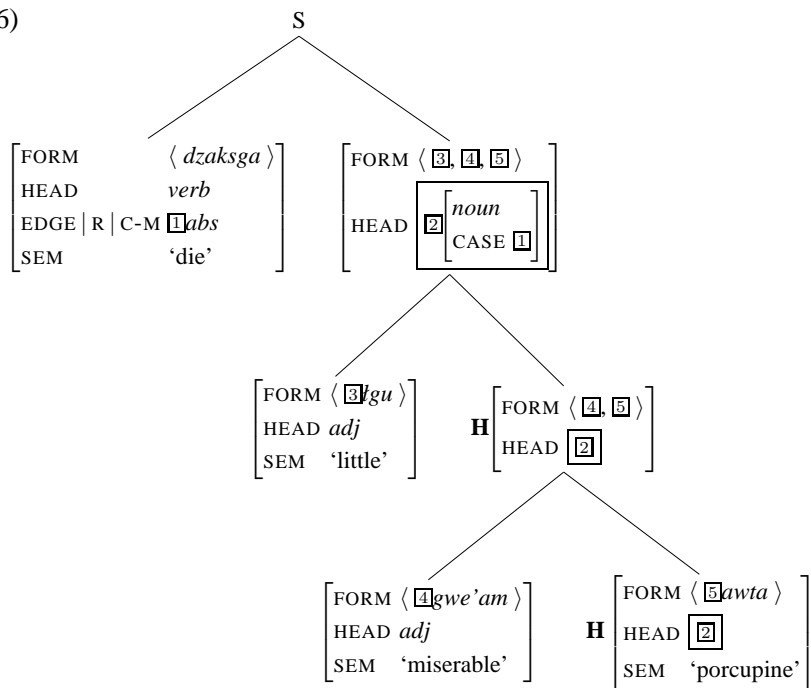## 5.3 The EDGE-Based Analysis and the More Complex Data

Having outlined the basics of the EDGE-based analysis in the previous subsection, I consider some of the data presented in section 2 and show how they can easily accounted for on the EDGE-based approach.

Examples like (25) indicate that adjectives can intercede between connectives and nouns:

(25)   Ada ła dm   dzaksga   łgu gwe'am   awta.
       Ada ła dm   dzak-[sga łgu gwe'am   awta].
       And near.FUT die-ABS.CN little poor.ADJ.CN porcupine
       'And poor little porcupine was about to die.'   repeats (5)

Sentences like this are perfectly expected on the EDGE-based analysis. On just about any analysis of adjectives, the noun will be the head of each noun-adjective unit and, by the Head Feature Principle, will share its HEAD features throughout the collection of nominal constituents. Thus, the CASE information of the noun phrase seemingly 'percolates' to the appropriate syntactic domain—adjacent to its marking word in the *hd-all-valents-cxt*—enabling (22) to license these sorts of phrases. A EDGE-based analysis tree of the relevant part of (25) is given in (26):
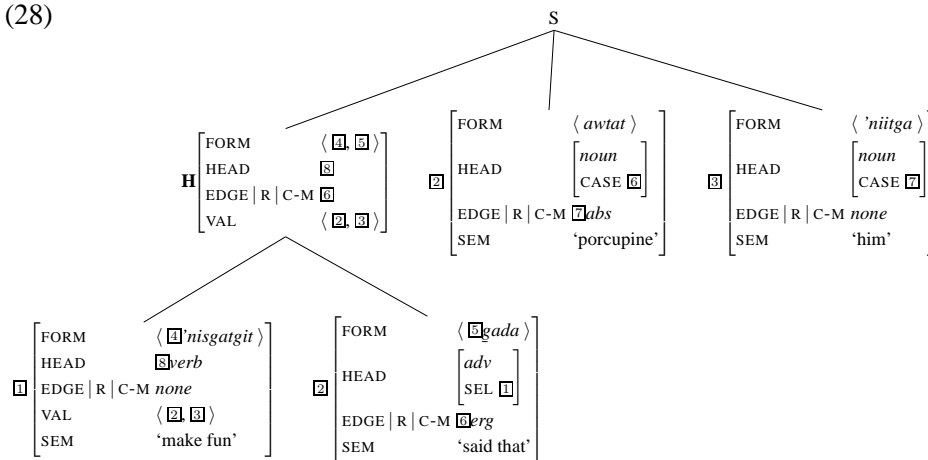
(26)

S

$\begin{bmatrix} \text{FORM} & \langle\ dzaksga\ \rangle \\ \text{HEAD} & verb \\ \text{EDGE}\,|\,\text{R}\,|\,\text{C-M}\ \boxed{1}\,abs \\ \text{SEM} & \text{'die'} \end{bmatrix}$ $\begin{bmatrix} \text{FORM}\ \langle\ \boxed{3},\ \boxed{4},\ \boxed{5}\ \rangle \\ \text{HEAD}\ \boxed{2}\begin{bmatrix} noun \\ \text{CASE}\ \boxed{1} \end{bmatrix} \end{bmatrix}$

$\begin{bmatrix} \text{FORM}\ \langle\ \boxed{3}\text{?gu}\ \rangle \\ \text{HEAD}\ adj \\ \text{SEM}\ \text{'little'} \end{bmatrix}$ **H** $\begin{bmatrix} \text{FORM}\ \langle\ \boxed{4},\ \boxed{5}\ \rangle \\ \text{HEAD}\ \boxed{2} \end{bmatrix}$

$\begin{bmatrix} \text{FORM}\ \langle\ \boxed{4}\text{gwe'am}\ \rangle \\ \text{HEAD}\ adj \\ \text{SEM}\ \text{'miserable'} \end{bmatrix}$ **H** $\begin{bmatrix} \text{FORM}\ \langle\ \boxed{5}\text{awta}\ \rangle \\ \text{HEAD}\ \boxed{2} \\ \text{SEM}\ \text{'porcupine'} \end{bmatrix}$

There are also the instances of case connectives on postverbal (possible) adverbs, as exemplified again in (27):

(27) Łat   'nisgatgit   gada   awtat   'niitga.
      Ła-t   'nisgatg-it   gad-[a   awta]-[t   'niitga].
      PST-3.ERG make.fun-3.ABS report-ERG.CN porcupine-ABS.CN 3SG

      'It is said that porcupine made fun of him.'   repeats (6)

These, too, are easily accommodated on the EDGE-based analysis, on almost any conceivable analysis of *gad-*. Let us assume, for the sake of discussion, that *gad-* selects for a fully unsaturated verb. (Other analyses where the adverbial element is either a valent of the verb or an affix are also possible; any of them will yield similar results to the analysis sketched here). Thus, the adverbial and verb will form a phrasal constituent, as shown in (28), the relevant part of (27):

(28)

S

H
[FORM ⟨ 4, 5 ⟩]
[HEAD 8]
[EDGE|R|C-M 6]
[VAL ⟨ 2, 3 ⟩]

2
[FORM ⟨ *awtat* ⟩]
[HEAD [*noun* ; CASE 6]]
[EDGE|R|C-M 7 *abs*]
[SEM 'porcupine']

3
[FORM ⟨ *'niitga* ⟩]
[HEAD [*noun* ; CASE 7]]
[EDGE|R|C-M *none*]
[SEM 'him']

1
[FORM ⟨ 4 *'nisgatgit* ⟩]
[HEAD 8 *verb*]
[EDGE|R|C-M *none*]
[VAL ⟨ 2, 3 ⟩]
[SEM 'make fun']

2
[FORM ⟨ 5 *gada* ⟩]
[HEAD [*adv* ; SEL 1]]
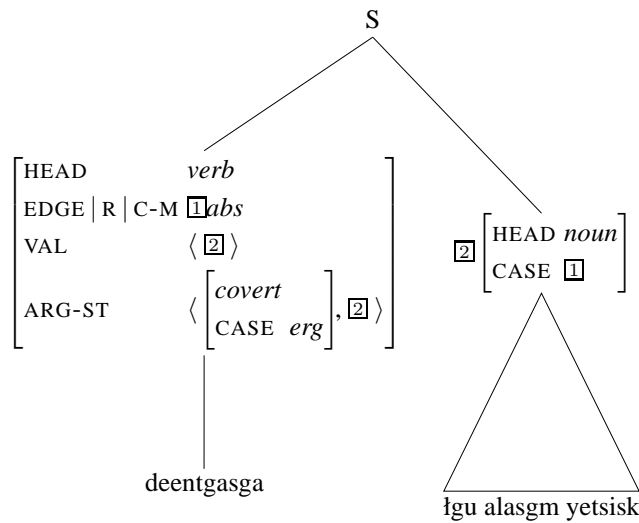[EDGE|R|C-M 6 *erg*]
[SEM 'said that']

The structure in (28) contains all the required specifications of the EDGE-based analysis. Lexically specified on the adverbial element *gada* is the EDGE|R|C-M value of *erg*. By the Edge Feature Principle (21), the EDGE value of the adverb (6) must be—and is—shared with the EDGE feature of its mother. This structure-sharing allows the daughters of the S to meet the constraint from (22) As the tags labeled 6 show, the verbal constituent that is the head daughter of the S has an EDGE feature that appropriately identical to the CASE value of the next constituent over, thus licensing the phrase.

Finally, the EDGE-based analysis, augmented with the now standard HPSG analysis of non-local realization (Bouma, 1996; Miller and Sag, 1997), also can handle the absence of a postverbal argument, such as occurs in (29):

(29) 'Yag̲ay 'wii gyisiyaasg-at in-t [deentg-asga   ɫgu alasgm
       instead great northwind-3 TOP-3 avenge-ABS.CN little weak.ADJ.CN
       yetsisk].
       animal
       'Instead, it was the great northwind that avenged the little weak animal.'
       repeats (7)

The Bouma/Miller and Sag analysis treats the absence of such arguments via a mismatch between the ARG-ST and VAL lists: the 'missing' argument appears on the ARG-ST list of the governing head, but not that head's VAL list. If 'missing' arguments in Coast Tsimshian are treated in the same fashion, then data like (29) can easily be accommodated in the EDGE-based analysis. With a missing ergative argument, a verb like *deentg-* 'avenge' has a VAL list that just contains its absolutive argument. As long as the lexical constructions permit connective-affixed verbs for all cases (and determiner types), the form *deentgasga* will be generated and have the specification EDGE|R|C-M *abs*. When such a form is combined with its one absolutive valent, it will meet all the constraints on *head-all-valents-cxt*. In particular, the EDGE values on the verb will match the CASE and IND values of the next constituent over. A tree showing this is given in (30):

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(30)

$$
\begin{array}{c}
\text{S} \\[40pt]
\begin{bmatrix}
\text{HEAD} & verb \\
\text{EDGE} \mid \text{R} \mid \text{C-M} & \boxed{1}\,abs \\
\text{VAL} & \langle\, \boxed{2}\, \rangle \\
\text{ARG-ST} & \left\langle\, \begin{bmatrix} covert \\ \text{CASE}\;\; erg \end{bmatrix},\, \boxed{2}\, \right\rangle
\end{bmatrix}
\qquad
\boxed{2}\begin{bmatrix} \text{HEAD}\; noun \\ \text{CASE}\;\; \boxed{1} \end{bmatrix}
\end{array}
$$

deentgasga

łgu alasgm yetsisk

In fact, this sort of example clarifies why the matching should be done within the constraint on *hd-all-valents-cxt* rather than (purely) in the lexical entries. While there is no technical hurdle to doing the matching in the lexical entries, constraints would have to be stated for every possible list of valents a verb could have (including those with missing arguments). In contrast, on the analysis sketched above, the Argument Realization Principle (the constraints on mismatches between the ARG-ST and VAL list) and the constraint on the *hd-all-valents-cxt* operate independently, yet come together to the license the appropriate structures when the two constraints interact.

Thus, in addition to the basic data outlined in section 5.2, the EDGE-based analysis also handles a wide-array of other data including the multiple adjectives, the connective-marking on (possible) adverbials, and, with slight augmentation from pre-existing analyses, the case-marking facts when verbs have a 'missing' postverbal argument.

6   Concluding Remarks

With a close examination of the behavior of the Coast Tsimshian host + case connective sequences, the evidence clearly points to the connectives being suffixes, even though what they suffix to—words lying outside their semantic/functional domain—is not 'normal' for case-marking affixes. In spite of the apparently odd location of these affixes, a fairly simple analysis of the syntactic combinatorics is available as long as the syntax is 'informationally rich'; that is, the dependency between the connective and the noun phrase it marks are 'visible' to the syntax in some way. In the EDGE-based analysis presented here, that visibility was achieved via the EDGE features on the connective-affixed words and the corresponding CASE and INDEX features on the nominal expressions. These features were then brought together by the constraint in (22), which requires words with

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certain EDGE features to be linearly adjacent to the word they mark. This analysis presents a simple yet elegant means of respecting the morphological constituency while still getting the various syntactic facts correct. The constraint in (22) combines morphological information, subcategorization requirements, and syntactic location to ultimately license Coast Tsimshian clauses. This suggests that, at least in some languages, all three of these elements can be important to understanding case-marking phenomena. So, it seems that the Coast Tsimshian case connectives are not so much 'in the wrong place', but rather they can be understood as occurring in a 'normal' place once a sufficient analytical apparatus for the morphology-syntax interface is in place.

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