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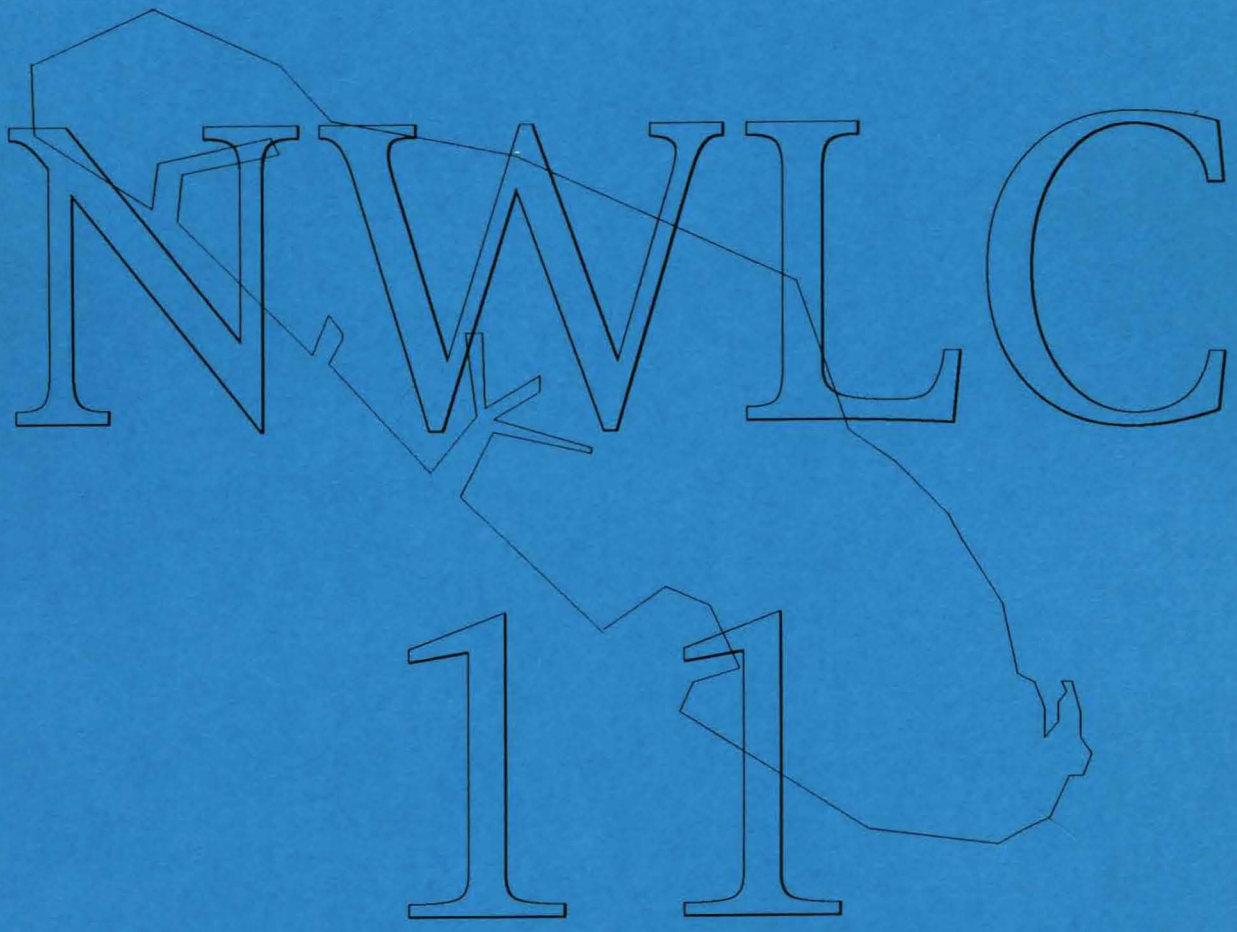




Volume 13

1996

# PROCEEDINGS of the ELEVENTH NORTHWEST LINGUISTICS CONFERENCE

Edited by

Violet Bianco, Paul Hopkins, Dave McKercher,
Maggie Warbey, and Marie Louise Willett

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## FOREWORD

The Linguistics Circle of the University of Victoria is pleased to present the Proceedings of the Eleventh Northwest Linguistics Conference in this year's volume of its Working Papers (WPLC). The Northwest Linguistics Conference is hosted annually on a rotating basis by the University of Victoria, Simon Fraser University, the University of British Columbia, and the University of Washington. NWLC 11—held at the University of Victoria on February 18th and 19th, 1995—had all four universities well-represented and included presenters from outside the Pacific Northwest. Of the 24 papers presented at the conference, 17 appear in this volume, representing a wide range of topics in linguistics. All of these papers are considered working papers, and their appearance in this volume does not preclude subsequent publication elsewhere.

The editors of this volume are grateful to John Esling and Tadao Miyamoto for additional editorial assistance, and to Susan Fitzgerald and Kevin Cattell for sharing their computer expertise (and to Jasper for sharing his mom and dad). The Northwest Linguistics Conference was supported by the Graduate Students' Society and the Department of Linguistics at the University of Victoria. These proceedings have been funded by the Graduate Students' Society and by the Faculty of Graduate Studies at UVic. We take this opportunity to thank them for their continuing financial support and encouragement.

V. Bianco, P. Hopkins, D. McKercher, M. Warbey, and M. L. Willett

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WPLC
Department of Linguistics
University of Victoria
P. O. Box 3045
Victoria, BC
CANADA
V8W 3P4

wplc@uvvm.uvic.ca

# THE X-BAR STATUS OF NEG

**Jumah Albayaty**

Department of Linguistics
Simon Fraser University

## 1.0 THE PHENOMENON

In Standard Arabic negative sentences, the negative morpheme carries tense and manifests the following alternation depending on the type of tense:

(1) a. r-rijaal-u qaam-uu
the-men-nom stood.up-Agr
"The men stood up."

b. r-rijaal-u **lam** ya-quum-uu
the-men-nom not-past imp-stand.up-Agr
"The men didn't stand up."

c. r-rijaal-u sa-ya-quum-uuna
the-men-nom fut-imp-stand.up-Agr
"The men will stand up."

d. r-rijaal-u **lan** ya-quum-uu
the-men-nom not-fut imp-stand.up-Agr
"The men will not stand up."

e. r-rijaal-u ya-quum-uuna
the-men-nom imp-stand.up-Agr
"The men are standing up."

f. r-rijaal-u **laa** ya-quum-uuna
the-men-nom not-present imp-stand.up-Agr
"The men are not standing up."

The agreement morpheme is affixed on the verb in these sentences. Note that in the negative versions, the Tense element and the negative form a complex which is morphophonologically independent of the complex, which consists of the verb and the Agreement element. In the affirmative versions, however, both the Tense and the Agreement elements are hosted by the verb.

## 2.0 THE CATEGORIAL STATUS OF NEG

Suppose that the sentential negative, *lan*, *lam*, and *laa*, is a head, i.e. an X-zero category, and not a specifier (Rizzi 1990) or an adjunct. Such a hypothesis provides a straightforward explanation for the fact that the negative can host a tense affix in (1). Since only heads are eligible hosts, treating Neg as a head allows us to capture the fact that it can lexically support tense. The property of hosting affixes characterizes both lexical heads (Ns, Ps, Vs, Adjs) and functional heads (Cs and Qs).[1] Adding Neg to the list of functional heads is a step towards forming a natural class with respect to the ability of acting as a host.

## 3.0 THE BLOCKING EFFECT OF NEG

Suppose, then, that the sentences in (1) all instantiate a structure in which Neg heads a NegP projection which is C-selected by Tense. The prediction that should follow from this hypothesis is the familiar phenomenon that the verb cannot move to T across the negative head:

(2) *[ya-quum-uu] **lan** r-rijaal-u t
imp-stand.up-Agr not-fut the-men-nom

This account is valid only if *lan* is assumed to be a head category which also implies that T is a head category. Consequently, Neg-movement is a process of head-movement. Neg movement to Tense provides a host for the affixal Tense, thus obviating the need for V-movement to Tense. Head movement is subject to the Head Movement Constraint (HMC) of Travis (1984:131):

(3) An X may only move into the Y which properly governs it.

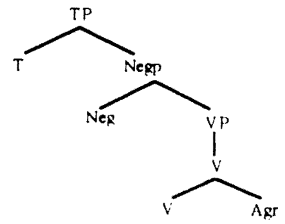
The main effect of the HMC is to block movement of a head category across another (m-commanding) category, thus guaranteeing that an affixal head attaches to the closest affixational host. Given the constraint on head movement expressed by the HMC or, more generally, by Relativized Minimality in the sense of Rizzi (1990) which prevents categories of the same type from moving across each other, the option of V-movement directly to Tense across Neg is not open. This option gives rise to a violation of Relativized minimality as it applies to head movement since the head category *ya-quum-uu* in (2) has moved across another (m-commanding) head category *lan*.

The picture that emerges from the blocking effect of Neg argues that the negative is a projected head. This is a standard claim based on X-bar theoretic assumptions that only a head category can block the movement of another head category.

## 4.0 THE RELATIVE ORDERING OF THE PROJECTIONS

The natural question that arises is whether T c-selects NegP, or Neg c-selects TP. Translating the two possibilities for c-selection into structural terms, we have (4) and (5):

(4)

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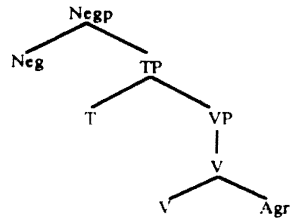


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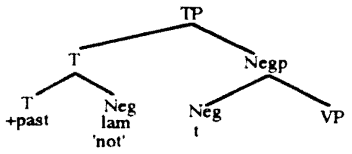



Assuming a clause structure as in (4) for Arabic negative sentences, the two separate complexes are derived in terms of Neg movement to T and base-generating Agr on the V node. This derivational step is represented in (6), where Neg is adjoined to T. The movement of Neg to T is motivated by the necessity to satisfy the requirements of the affixal T for lexical support. The availability of Neg to serve as a support for T explains why Arabic does not resort to a language-particular strategy similar to the process of "do-support" in English negative clauses.[2] The difference between the two constructions in the two languages relates to the nature of the Neg category in combination with an independent principle of UG. The principle in question is Minimality, its subpart which prevents the Neg category in English from moving to Tense on the assumption that Neg is not a head category in English. Given that the Arabic Tense can be supported in terms of a legitimate application of Move-alpha, the absence of a last resort strategy such as the insertion of an expletive verb is a small wonder. The insertion of a supportive verb in English should not come as a surprise either since the construction cannot be saved by a lawful application of Move-alpha.

That Agr(eement) is on the right side of/inside Tense in the derived verbal complex is seen from affirmative tensed clauses (7). Note that the reverse order of Tense and Agr produces ungrammaticality in (8):

(7) sa-ya-ʔkulu ar-rajulu
will-imp-eat the-man
'The man will eat'

(8) *ya-sa-ʔkulu ar-rajulu

In such clauses—that is, in the absence of a negative element—the [V+Agr] complex moves obligatorily to T, thus accounting for the fact that in sentences such as (7) the Tense and the Agreement elements appear attached to the verbal complex. In the presence of a negative element, given the HMC—which bans movement of a head across another head—movement of the [V+Agr] complex to T would violate the HMC. Since this movement would apply across another head, (2) is ungrammatical. Notice also that movement of the verbal complex through Neg, which is allowed by the HMC, would be unmotivated. Neither the verb nor the negative is affixal.

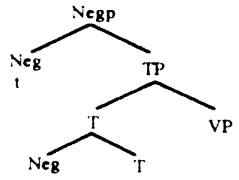
Structure (4) makes the prediction that the inflected negative can further move up to C in direct yes-no questions if C is filled by an affix. This prediction is borne out:

(9) ʔa-lam ta-ʔkul
Q-not-past 2imp-eat
'Didn't you eat'

(9) exemplifies successive cyclic movement of Neg to T and then to C to support the bound question morpheme *ʔa*. Structure (4), then, accounts for the the fact that T and Agr inflections appear on different head complexes, on the negative head and the verbal head respectively.

On the assumption that NegP dominates TP as in structure (5), V-movement to T should be expected since it would not violate the HMC. The prediction that follows from this hypothesis is that under all circumstances the Tense and Agreement elements together should appear affixed on the same head, contrary to fact. The remaining derivational alternative is to assume that the affixation involves Neg lowering to T:

(10)




While this derivation correctly attaches Tense and Agreement on separate complexes, it falls short of providing a theoretically coherent and empirically viable structure of the clause in Arabic. In addition to the oddity of moving a root head, i.e. Neg to an affixal head, it results in a trace m-commanding its antecedent. Also, the fact Neg can raise to C, as illustrated in (9) argues against a lowering analysis.

The conclusion that emerges from this discussion is that the property of Neg as a host for Tense in Standard Arabic receives a natural explanation only if Neg is attributed an autonomous status as a head situated between T and V as in (4). As such,Neg aborts V-movement to Tense and and carries the Tense inflection itself.

## 5.0 VERB MOVEMENT IN THE CONTEXT OF NEGATION

In Iraqi Arabic sentential negation is expressed by the bound prefix *ma*:

(11) a. ma ʔakal ʔay shi
neg read-I many book
'I did not read many book'

b. ma qire-tʃidat kutub
neg eat anything
'He didn't eat anything'

(12) a. ma kint hna
neg have time
I don't have time'

b. ma ʃindi waqt
neg was here
'I wasn't here'

Based on the morphological evidence from Standard Arabic where the negative is an eligible host (thus a movable category) for Tense, let us assume, as suggested above, that the negative prefix *ma*

in Iraqi Arabic is also an independent syntactic category which heads its own maximal projection NegP. NegP is situated between TP and VP as in structure (4).

The syntactic relevance of the prefix *ma* is established by its licensing the negative polarity item *ʔay shi* in (11a) above and by its licensing the quantifier *ʕidat kutub* in (11b). Note that (11b) is ambiguous: The quantifier can be interpreted within the scope of *ma* or outside its scope.

Notice that the fact that the Tense element is morphologically null makes it impossible to determine its relative ordering in relation to Neg in the clause structure of Iraqi Arabic. Nonetheless, let us assume the following to be true for both Standard Arabic and Iraqi Arabic:[3]

(13) T c-selects NegP

as in (4) above. Given that T immediately dominates NegP, the HMC guarantees that the Tense inflection would always appear adjacent to Neg in the derived complex. The fact that the verbal root, the negative prefix and tense form a morphophonological unit at S-structure in the sentences in (11) can then be derived by successive cyclic movement of the verb to Neg and to T. Given the affixal nature of Neg in Iraqi Arabic, we correctly predict that it will not block V-movement to T. The verb does not move to T across Neg, but adjoins to Neg first. The verb in T, by raising to Neg, can antecedent-govern its trace through Neg. Consequently no HMC violation results. Notice that V-movement directly to T, that is across Neg, gives rise to a violation of the HMC, hence (14) is ungrammatical:

(14) *ʔakal ma.
ate not

The basic difference between Standard Arabic and Iraqi Arabic in this respect reduces to a difference in the morphological features of the negative head projection. More specifically, the negative head in the former is a non-affixal head, whereas in the latter it is affixal. This feature can be formulated in terms of the following parameter:

(15) The Neg parameter: (i) Neg is [+free]
(ii) Neg is [–free]

This minimal parametric difference accounts for the derivation of the two verbal complexes in the two languages. Taking value (i) of the Neg parameter first, the [+free] property of the Negative morphemes implies that the [V+Agr] complex cannot move to Neg since this movement would be unmotivated, hence excluded. Taking value (ii) of the Neg parameter, the [–free] property implies that the [V+Agr] complex can, and, in fact, must move to Neg, and further up to T.

In terms of this analysis, the distinction between the two languages with respect to V-movement in the context of negation is argued to follow from a parametric difference in the morphological features of Neg. The HMC is thus sensitive to the morphological status of the categories it applies to. Below we discuss evidence from infinitival clauses in Standard Arabic (SA) and Iraqi Arabic (IA) which lends significant support to the analysis suggested above.

## 6.0 INFINITIVAL CLAUSES IN STANDARD ARABIC AND IRAQI ARABIC

While Standard Arabic allows Neg-movement to T in tensed clauses as discussed above, it does not allow it in the context of the infinitive:

(16) a. qarrra-tu ʔan lan ʔusaafira
decided-I to not go
'I decided to not go'

b. *qarrra-tu lan ʔan ʔusaafira
decided-I not to go

V-movement to Neg is equally blocked in both contexts. The following shows the impossibility of V-movement to Neg in an infinitive context:

(17) *qarrra-tu ʔan ʔusaafira lan
decided-I to go not

Similarly, the same movement is aborted in the affirmative infinitival context:

(18) *qarrra-tu ʔusaafira ʔan
decided-I go to

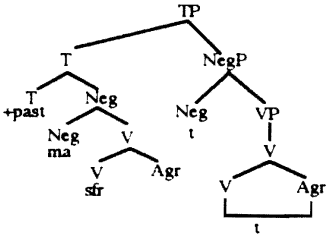
In this respect, Iraqi Arabic contrasts with Standard Arabic. V-movement to Neg is available in all contexts in the latter as is evident from the affirmative tensed clauses in (11) and from the non-tensed contexts in (19):

(19) a. qarrar-it ʔasaafir
decided-I to go

b. qarrar-it ma ʔasaafir
decided-I not to go

Our analysis predicts that bound morphemes should not block head-movement. The negative head *ma* is affixal whereas *lan* is free. Like any projected bound heads, *ma* and the abstract infinitival T in Iraqi Arabic require a lexical host at SS. This morphological property of *ma* and the abstract zero T forces V-movement to Neg and then to the abstract T, taking Neg along with it without violating the HMC. V in its surface location in T binds its trace through Neg. This is schematized below:

(20)



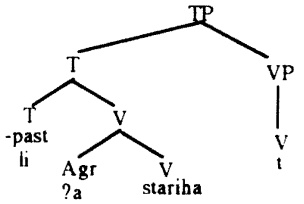

Neither the T head nor the negative head in Iraqi Arabic blocks V-movement because at SS, the level where the verb needs to antecedent-govern its trace, the negative is incorporated into the verb.[4] In standard Arabic, on the other hand, Neg-movement to the overt T is unmotivated since both Neg and the infinitive T are [+free]. This accounts for the contrast in (16). The ungrammaticality of (17) is also accounted for: V-movement can only apply across Neg since Neg is a free morpheme in this language. (18) also follows from the morphological property of the infinitival T *ʔan*, its being a free morpheme obviating the need for morphological well-formedness, thus blocking V-movement.

A similar conclusion is suggested by certain properties of purpose clauses in Standard Arabic. Their Tense marker, *li-*, is [-free] and appears prefixed on the [V+Agr] complex, contrasting with the infinitive clauses of this language discussed above:

(21) jalas-tu li-ʔastariha
sat-I to-rest
'I sat to take some rest'

It should be clear that the facts of purpose clauses, with respect to V-movement to the Tense marker *li-*, pattern with those of the affirmative tensed clauses in both Iraqi Arabic and Standard Arabic. The [-free] feature of T forces V-movement to satisfy its morphological requirement:

(22)




If T is non-affixal, naturally, the prediction should be that the verb would fail to move to the T position. This is attested in SA infinitivals of the type exemplified in (16), and in English infinitives where *to* is non-affixal:

(23) a. I bought a knife to cut the bread with.

b.*I bought a knife cut to the bread with.

Given this parallelism, it is only natural to state the reasons underlying the optionality of V-movement in these languages in terms of the following parameter:

(24) The T Parameter: (i) T is [+free]
(ii) T is [–free]

The [-free] Tense element appears as a constituent of the [V+Agr] complex or of the Neg element. The merger between the two constituents results from the process of head movement. The host for Tense, that is whether Tense appears inflected on the verbal complex or on Neg is determined by Minimality and the underlying hierarchical order of Tense and V, as discussed above.

In terms of the T Parameter (24) we accounted for the morphological versus the periphrastic nature of infinitives in Standard Arabic as opposed to the periphrastic nature of the English counterpart. Standard Arabic infinitives instantiate both values of the T Parameter, whereas English infinitives instantiate only the first value.

## 7.0 VERB MOVEMENT IN THE CONTEXT OF NEGATION IN FRENCH AND EGYPTIAN ARABIC

An equally principled explanation of the interaction of negation with V-movement in French and Egyptian Arabic can be provided along similar lines. The explanation relies in part on the assumption embodied in the Neg Parameter stated in (15) that there is a distinction between affixal and non-affixal negative categories. Affixal categories are subject to an SS requirement that they must attach to a base.[5] The facts of these languages in the context of negation are similar to those of Iraqi Arabic, and contrast with Standard Arabic.

Starting with French, negation in finite clauses is expressed by two discontinuous elements, *ne-*, which appears prefixed on the verb, and *pas* which follows the verb:

(25) a. Jean ne parle pas anglais.
"Jean does not speak English."
b. Jean n'a pas dormi.
"Jean has not slept."
c. Jean n'est pas fou.
"Jean is not stupid."

Note that Tense is realized on the verbal complex, not on Neg, unlike Standard Arabic. Pollock (1989) suggests that *ne* is the head of NegP and *pas* is a specifier.

Egyptian Arabic displays the same discontinuous pattern, a prefix *ma* and a suffix *sh*:

(26) a. ma-ʃraf-sh
not-know I-not
'I don't know

b. ma-ʃindi-sh
not-have I-not
'I don't have'

c. ma-fi-sh
not-there-not
'There isn't'

As in French, and on the basis of its similarity with Iraqi Arabic, we assume that *ma* in Egyptian Arabic is the head of NegP, while *sh* occupies the specifier of NegP, or is adjoined to the head category to its left.

The fact that the head *ne* and the head *ma* both appear attached to the verbal complex suggest that they are affixal. In other words, they have value (ii) of the Neg Parameter (15) repeated below:

(27) The Neg parameter: (i) Neg is [+free]
(ii) Neg is [–free]

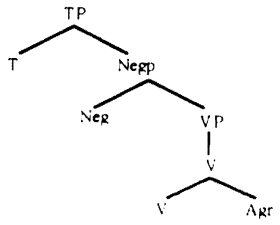
The implication that this value has for the derivation of negative clauses in French and Egyptian Arabic is that it forces the verb to move to Neg. The situation described here contrasts with SA where Neg has value (i) which implies that the verb is forced to remain inside VP.

In order to discuss the derivation of negative clauses in French and Egyptian Arabic, we need to determine the position of Neg and T in relation to the verb in the clause structure. That is, we need to establish the issue of representation of these head categories.

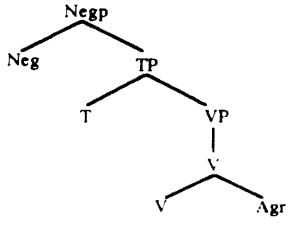
## 8.0 THE ORDER OF NEG AND TENSE

Two possibilities suggest themselves. The first is the Standard Arabic and the Iraqi Arabic type of clausal structure where T governs Neg as in (28) below. The second possibility is a clausal structure in which Neg governs T as in (29). The two structures are schematized below:

(28)




(29)




Notice that the two structures are compatible with the requirements imposed by the HMC. Cyclic V-movement to the highest head attaches the negative heads, the french *ne* and the Egyptian Arabic *ma* on the verbal complex, hence the prefixal nature of the negative head. The verb at SS according to both structures can bind its trace since in moving to the topmost head it drags the intervening head along with it rather than moving across it. Insofar as the derivation of the data in (25-26) is concerned, the two structures are equally plausible. On universalist grounds, it is also tempting to assume that the Neg category occupies the same position in the clause structure of French, Egyptian Arabic, Standard Arabic and Iraqi Arabic, always governed by T as in (28). However, structure (28) where T immediately dominates NegP, cannot be right as shown by fact that the future Tense marker *ha* 'will' appears inside Neg in Egyptian Arabic:

(30) a. ma-ha-yktib
not-will-write
'He will not write'

b. ma-ha-ykuun waadih
not-will-be clear
'it will not be clear

This fact is not accounted for by structure (28) since it makes the incorrect prediction that the future Tense affix should appear outside Tense. The following are the ungrammatical counterparts of the examples in (30). In each case *ha* is external to Neg:

(31) a. *ha-ma-yktib
will-not-write

b. *ha-ma-ykuun waadih
will-not-be clear

c. *ma-yktib-ha
not-write-will

d. *ma-ykuun-ha waadih
not-be-will- clear

The examples in (30-31) provide the motivation for adopting structure (29) instead of (28). Since (29) base-generates Neg in a position governing T, it not only derives the correct form of the verbal complex with Neg being outside Tense instead of inside it, but it also accounts naturally for sentences displaying incorrect order of affixes. In the absence of evidence to the contrary, we assume that French patterns with Standard Arabic and Iraqi Arabic. Both select structure (28) over (29). Egyptian Arabic differs from this group of languages in selecting (28), more specifically in encoding the following ordering constraint:

(32) The Neg Parameter: Neg is c-selected by T in Egyptian Arabic

## 9.0 CONCLUSION

To summarize, we provided justification based on morphological evidence for placing Neg in different positions in the clause structure of two sets of languages. The two sets of languages differ not only in the relative position of Neg but along another related property. Neg in Iraqi Arabic, French and Egyptian Arabic is affixal. It is non-affixal in Standard Arabic and English. The typological distinction that this difference gives rise to is that in the former type of languages the verb in clauses that contain a negative element has a complex morphological form, while in the latter type it has a simplex morphological form. The proposed analysis, if correct, depends crucially on the assumption that Neg is a head in its own right and therefore interacts with V-movement.

## NOTES

1 Facts relating to the ability of quantifiers in Standard Arabic to host clitics and to receive Case receive a simple and a principled explanation once quantifiers are assumed to head a maximal projection, QP.

2 'do support': the insertion of a verbal expletive auxiliary in the presence of *not* to host the Tense inflection is expected in English given that Neg does not have the ability to host the Tense inflection:

(i) a. I didn't eat.
b.*I not eat

We assume that "do-support" applies as a repair strategy when the legitimate process of T lowering, rather than V-raising, fails to apply. The reason we adopt lowering, not raising, for English is due to the effect that V-movement would have on the derived word order of clauses containing VP-adverbs:

(i) a. John slowly touched the sword.
b.*John touched slowly the sword.

A raising analysis makes the false prediction that the verb would always leave the adverb behind giving rise to unattested structures as in (ib).

In the context of sentence negation, the strategy inserts *do* at S-structure, that is subsequent to the failure of T-lowering. This suggestion has important consequences for head movement in English. In particular, failure of V-movement to T in the context of negation in English is not a case of minimality, i.e. is not due to Neg being an intervening head category with a blocking effect. A minimality based account of "do insertion" is adopted in a number of recent analyses (Laka 1990, Pollock 1989, and Chomsky 1988, among others). We treat Neg in English as an

adjunct, and assume with Pollock (1989) that only modals, due to their strength, are raised to T. Lexical verbs are weak and thus remain inside VP.

3 The prediction that this assumption makes is that, if the Tense element were overt, it should appear at the periphery of the [Neg+V+Agr] adjunction structure, not inside it. Evidence from the Baghdadi dialect disconfirms this prediction:

(i) ma-da-y-ktib
not-present-Agr-write
'He is not writing'

Notice that the present Tense morpheme *da* appears inside the complex, not outside. This fact argues against postulating a uniform structure for negative clauses in Standard Arabic and Iraqi Arabic. The postulated structure gives rise to unattested order of affixes: *[da-ma-y-ktib] with uniform right adjunction, *[y-qra-ma-da] with uniform left adjunction, *[ma-y-ktib-da] with non-uniform right then left adjunction, and *[da-y-ktib-ma] with non-uniform left then right adjunction. There are three possibilities in which the correct surface order of the affixes can be derived from structure (4). The first possibility is direct movement of the verb to T followed by Neg raising to T. The direct V-movement, however, is excluded by the HMC. The second possibility is is to assume that Neg first moves to T followed by V-movement. The third alternative is to assume a lowering analysis with T lowering to the verb first followed by Neg lowering. Since lowering is not subject to the HMC, the issue of the specific order on affixes does not arise. This alternative, however, is ruled out by a general ban against lowering. These problems do not arise if negative clauses in Iraqi Arabic are assumed to derive from an underlying structure in which NegP dominates TP. In terms of head selection, then, the difference between Standard Arabic and Iraqi Arabic would be as follows:

(ii) Standard Arabic: T c-selects NegP.
(iii) Iraqi Arabic: Neg c-selects TP.

4 A ban is needed to block the movement of V alone from inside the complex head category. Extraction out of complex head categories would give rise to unattested orders of affixes. Such orders may be excluded if we assume that Move-alpha may not move a part of a derived head. This can be stated in terms of the following filter:

*[X-zero ... t ...].

Assuming this filter, the only possible material that may undergo successive cyclic head movement is the entire unit.

5 The requirement is proposed in Lasnik (1981:164) in terms of the following filter:

A morphologically realized affix must be a syntactic dependent of a morphologically realized category at Surface Structure.

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# TRANSITIVITY AND CAUSATION IN LUSHOOTSEED MORPHOLOGY*

**David Beck**

Department of Linguistics
University of Victoria

## 1.0 VALENCY-INCREASING SUFFIXES

The morphology of Lushootseed, a Salishan language of the Puget Sound area of Washington State, is notable for its use of a set of verbal suffixes which mark the syntactic role of the arguments of the verb to which they are attached. Hess (1993a) divides these suffixes into agent- and patient-oriented classes, depending on the semantic role taken by overt third person arguments, as in (1).[1]

(1) (a) Patient-oriented
ʔu+gʷəc̓+əd tsi c̓ac̓as
[pnt]+look+patient Df child
"[someone] looked for the girl" (Hess 1993a: 44)

(b) Agent-oriented
ʔu+gʷəc̓+əb tsi c̓ac̓as
[pnt]+look+agent Df child
"the girl looked for [someone]" (Hess 1993a: 9)

In (a), the NP is identified as the goal of the action, the transitive object, by the patient-oriented suffix *-t* (realized as [-əd]);[2] in (b), which is intransitive, the NP is identified as the agent, or subject, by the appearance of *-b*. The same pattern does not hold if the subject is first- or second-person.

(2) (a) ʔu+gʷəc̓+əd čəd tsi c̓ac̓as
[pnt]+look+patient I Df child
"I looked for the girl" (rare) (Hess 1993a: 10)

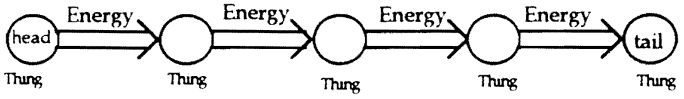
(b) ʔu+gʷəc̓+əb čəd ʔə tsi c̓ac̓as
[pnt]+look+agent I P Df child
"I looked for the girl" (based on Hess 1993a: 43)

Here the first-person pronoun is interpreted as agentive irrespective of the inflectional marking on the verb. In (a), the *-t* suffix has created a transitive verb, whereas the verb in (b) is intransitive and the preposition *ʔə* is required for the expression of the semantic goal.[3]

In all there are four patient-oriented (*-s* ~ *-c* "[applicative]", *-txʷ* [causative], *-dxʷ* [lack of control], *-t* "[patient-orientation]") and one agent-oriented suffix (*-b* "[middle]") that increase the valency of the stem to which they are attached. Cross-linguistically this situation is highly unusual. In general, valency-increasing affixes are confined to causatives, applicatives, and instrumentals (Comrie 1985) and in those languages where such suffixes are not associated with one or the other of these functions, the morpheme (often referred to as a "transitivizer") is generally homophonous with the causative (Kemmer and Verhagen 1994). In Lushootseed, these generalizations seem to apply only to two of the suffixes— *-s* ~ *-c* "[applicative]" and *-txʷ* "[causative]": the remainder do not obviously fall into any previously defined class of valency-increasing morphemes. The analysis here will resolve this dilemma by showing that *-t* , *-dxʷ* , and *-b* should be grouped together with *-txʷ* as causatives of a different order, used to mark the causality inherent in the transitive construction.

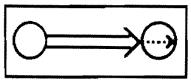
## 2.0 TRANSITIVITY, CAUSATIVITY, AND COGNITIVE GRAMMAR

Although the link between transitivity and causation has been made a number of times in the literature (cf. the papers in Shibatani 1976 and Comrie and Polinsky 1993), the most explicit connection between the two is made by Langacker (1991), who analyzes the transitive clause as being symbolic of a simple causative interaction between two objects. This idea is predicated on what Langacker terms the "billiard-ball" model of the universe—that is, the construal of the universe as consisting of energetic interactions of discrete objects or things, illustrated by the action chain in (3).

(3) 

(based on Langacker 1991: 283)

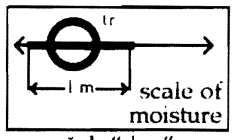
Chains such as this are initiated by the first object, or head, which transfers energy into the second object, which in turn interacts with the next object, and so on until the transmitted energy reaches the end or tail of the chain. The canonical event model is seen as a reduced form of this chain, consisting of a head that initiates the event and a tail or "theme"[4] that undergoes an internal change of state, as in (4).

(4) 

(based on Langacker 1991: 285)

In (4) the relation between the head and the internal change of state of the tail (broken arrow), is one of causation (the broad arrow), as it is the energy of the former which brings about the latter. In the canonical transitive clause, the event is construed as such an interaction, with the head of the action chain coded as the subject and the theme as the direct object. Although not all grammatically transitive clauses describe such events, Langacker (1991) and others (Kemmer and Verhagen 1994) have argued that non-causative transitive constructions are in fact modeled on the transitive event by analogy, making this model a conceptual template or archetype for a wide range of other events.

In Cognitive Grammar (CG) terms, the head of the transitive chain represented in (4) is referred to as the **trajector**, defined as the most salient or primary clausal figure. This is seen in (5), which represents *šab* "dry".

(5) 

šab "dry"

Here the trajector (dark circle), represents an entity—singled out as being dry by the speaker—which is located at some point on the scale of moisture (double-headed arrow) falling within that portion of the scale conceived of as constituting "dryness" (the thickened line); this portion of the scale is referred to as the **landmark** (lm), or secondary clausal figure. Both the trajector and the landmark in this representation are **profiled** (indicated by thickened lines)—accorded special prominence by the speaker as focal points of the utterance. In (5) the landmark is a referential landmark in that it serves to locate the trajector in some region of conceptual space; a landmark, however, can also represent a second clausal participant, in which case it is realized as the direct object, the trajector being realized as the subject.[5]

## 3.0 THE LUSHOOTSEED VERB

Hess (1993b) defines the most basic descriptive unit of the Lushootseed verb to be the radical stem—that is, the root with no accompanying affixes. With only a handful of exceptions, the profile

of radical stems never includes more than a single participant which represents the tail of the action chain designated by the corresponding transitive verb; this is seen most clearly in verbs as in (6):

(6) (a) ʔu+pus čəd
[pnt]+be•hit•by•flying•object I
"I [am/was] struck (by a flying object)"

(b) ʔu+pusu+d čəd[6]
[pnt]+be•hit•by•flying•object+[caus1] I
"I pelted [someone]"

(c) ʔu+c̓ax$^{w}$ čəd
[pnt]+be•struck I
"I [was] struck"

(d) ʔu+c̓ax$^{w}$a+d čəd
[pnt]+be•struck+[caus1] I
"I struck [someone]" (Hess and Hilbert 1976: II, 136)

Verbal radicals are not the only candidates for the addition of valency-increasing suffixes: words corresponding to English adjectives often serve as the root of a verb and may appear in copular sentences which are syntactically and morphologically identical to sentences with a radical verbal stem as predicate. Conversely, radical verbal stems can serve attributive roles in a sentence. These facts suggest that at the level of the radical there is no clear distinction between verb and adjective, the only potential exceptions being a few inherently transitive stems and a handful of words like *luƛ̓* "old" and *haʔɬ* "good" which do not appear with the stative aspectual prefix *as-/ʔəs-* (Hess, personal communication).

This conflation of verb and adjective fits well with a proposal made by Givón (1979) that the lexical class "adjective" represents, rather than a universal category, a language-specific portion of the continuum of time-stability. This continuum runs from the active pole—depicting rapid change of state (verbs)—through temporary states (verbs/adjectives) to permanent-inherent properties (adjectives/ nouns) and objects and other things that do not change their identity over time or change it slowly (nouns). Givón notes languages vary as to how the middle portion of the continuum is lexicalized. In some languages temporary states are generally verbs (Krio, Topotha) while in others they are adjectives (English); other languages differ as to whether permanent-inherent states are most often adjectives (English, Bantu) or nouns (Walbiri). In Lushootseed, we have the verbs forming a morphologically uniform class with both the temporary and inherent-permanent adjectives. Interestingly, those radical stems that seem the best candidates for forming a distinctive class of adjective in Lushootseed—those that do not take the stative prefix—are those that lie at the high end of the permanent-inherent end of the spectrum and some of these (such as *luƛ̓* "old, old one") are used regularly as nouns. In CG, both verbs and adjectives express relations, the distinction being between those which profile a relation over time (verbs) and those which profile an atemporal relation (adjectives). In terms of Givón's continuum, languages thus differ as to whether temporary-state adjectives are construed to be temporal or atemporal relations. In languages that express tense in their verbal morphology, the distinction between temporal and atemporal relations is often made in the syntax by the appearance of a copula in predicate-adjective constructions. In Lushootseed, however, tense is not marked in this way and there is no copula, leaving us no way in which to distinguish between intransitive verbs and adjectives: therefore, the present analysis will assume that the verbal radical is an atemporal—and hence basically adjectival—relation which stands in a copular relationship with its subject, a stand which is by no means at odds with the Lushootseed propensity for forming sentences with non-verbal predicates.

### 3.1 *-b* "[middle]"

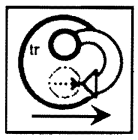
The first suffix to be considered here is *-b*, which Hess (1993a) dubs "middle voice", although in its canonical form it is not a voice (as defined by Mel'čuk 1993) as it increases the number of actants the verb has rather than merely permuting their syntactic roles. *-b* has two uses which correspond

conceptually to the traditional middle, which "serves to express that the subject is acting on herself/himself (reflexive) or for herself/himself" (Trask 1993: 171).[7] Corresponding to the second of these, the canonical middle denotes that the change of state described by the radical is caused on something in the subject's possession or for the benefit of the subject:

| | | | | |
|---|---|---|---|---|
| (7) | (a) | ƛ̓aċ̓ | > | ƛ̓aċ̓+əb |
| | | "cinched" | | "cinch up one's own belt" |
| | (b) | dˀakʷ | > | dˀakʷaa+b |
| | | "shake, rock" | | "wag [one's tail]" |
| | (c) | ɬič̣ | > | ɬič̣i+b |
| | | "get cut" | | "cut cattails [for matting]" |
| | (d) | šab | > | šab+əb |
| | | "dry" | | "dry sth [of one's own]" |

This can be represented as in (8).

(8)




Here, the trajector is seen as acting on something within its possessive domain,[8] indicated by the larger circle surrounding the trajector and the unprofiled theme. This theme (dotted circle) corresponds to the trajector of the radical. *-b* involves the notion of causation, but the trajector's action is construed as turning back towards the actor itself; this deviation from the standard pattern results in an intransitive clause—the theme requiring the preposition ʔə if it is to be overt. The canonical middle is the only usage of *-b* which increases valency.

The second standard use of the middle is the "reflexive" middle, in which the subject acts not on some object in its possession but directly on itself. Compare the examples in (7) with those in (9):

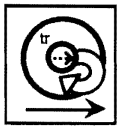
| | | | | |
|---|---|---|---|---|
| (9) | (a) | həd ʔiẇ | > | həd ʔiẇb |
| | | "inside" | | "go inside, enter (house)" |
| | (b) | p̓il | > | p̓il+əb |
| | | "flat" | | "go flat" |
| | (c) | dˀaƛ̓ | > | dˀaƛ̓+əb |
| | | "confused" | | "be wrong, make a mistake" |

The applicable subschema is shown in (10). Note that here, unlike (8), the trajector of the middle form is the same as the trajector of the radical; both represent the tail of an action chain, although here this chain has been made explicit in that the trajector is seen as being the theme of a causative interaction of which it is also the initiator. This group, which is not very numerous, coincides in meaning with the true reflexive, formed from a transitive verb with the reflexive suffix *-(s)ut*.

(10)


These two uses of the middle, while constituting distinct semantic structures, are clearly similar, and can be related schematically as subtypes of a prototype,

(11)



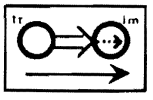
Prototypically the middle voice is depicted as canonically designating an event in which the trajector's energy is returned to within its own possessive domain; depending on the verb to which the middle is applied, the theme may be shifted to another object in that domain or remain with the trajector itself, thereby selecting the appropriate subschema.

3.2 *-t* "[first-order causative]"

The most common patient-oriented suffix is the "transitivizer" *-t*. The function of *-t* is to add a link to the action chain by adding an agent which causes the change in state of the theme. Consider the following:

| | | | | |
|---|---|---|---|---|
| (12) | (a) | həd?iẇ | > | həd?iẇ+d |
| | | "inside" | | "take sth inside" |
| | (b) | hud | > | hudu+d |
| | | "burning" | | "burn sth" |
| | (c) | ɬič | > | ɬiči+d |
| | | "get cut" | | "cut sth" |
| | (d) | pil | > | pili+d |
| | | "flat" | | "flatten sth" |
| | (e) | k'ʷəɬ | > | k'ʷəɬ+əd |
| | | "flow, spill" | | "spill, pour sth" |

In terms of its CG representation, *-t* corresponds to the canonical event model in (4) and (13).

(13) 

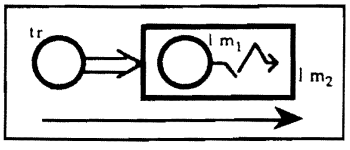

The morpheme here is seen as creating an action chain of which the trajector is head and the landmark tail. The relation between the trajector and the thematic change of state is causative, and the event is seen as a single process in which the trajector participates directly, playing the semantic role of agent (hence the term "first-order causative"). An exception to this pattern is experiencer verbs such as

| | | | | |
|---|---|---|---|---|
| (14) | (a) | k'ʷil | > | k'ʷili+d |
| | | "peek, peer out" | | "peer out at sth" |
| | (b) | ləq | > | ləq+əd |
| | | "hear" | | "hear sth" |

In constructions such as these, the trajector or subject of the transitive form is clearly not agentive in the canonical sense of effecting a change in the landmark/direct object, which is unaltered by the interaction. Experiencer verbs do not represent a causative relationship, but are structured as transitive events by analogy, just as they are in languages like English (see section 2 above).

3.3 *-txʷ* "[second-order causative]"

Of the patient-oriented suffixes, *-txʷ* is the morpheme which best corresponds to the standard causative pattern discussed most frequently in the literature (e.g. Comrie 1985), represented in (15).

(15) 


(based on Langacker 1991: 410)

When combined with a radical, *-txʷ* adds a participant (tr) which is construed as the agent of some other (second-order) process in which it is not a direct participant, at least in the sense that the tra-

jector of the causative as a whole is not conceived of as the trajector of the initiated process. The trajector of the radical becomes the primary landmark ($lm_1$) of the clause, while the process itself—specified by the radical on which the causative is built—becomes a secondary, referential landmark ($lm_2$). This is seen most clearly when the process caused by the trajector is a verb of motion:

| | | | | |
|---|---|---|---|---|
| (16) | (a) | ʔəƛ̓ | > | ʔəƛ̓+tx$^{w}$ |
| | | "come" | | "bring sth" |
| | (b) | ʔibəš | > | ʔibəš+tx$^{w}$ |
| | | "walk" | | "take s.o. for a walk" |
| | (c) | ʔuǰ$^{w}$ | > | ʔuǰ$^{w}$+tx$^{w}$ |
| | | "go" | | "take" |

In these expressions, the object of the causative is seen to have undergone the type of motion designated by the radical, but the source of energy or cause of that motion is a second participant in the event, realized as the subject/trajector. Thus, the verb *ʔəƛ̓tx$^{w}$* "bring sth" means "to cause sth to come": the focus of the verb is the process of motion towards the speaker designated lexically by the radical ($lm_2$), but it is the direct object ($lm_1$) which undergoes this process rather than the subject. In addition, there are a large number of other roots that form obvious second-order causatives.

| | | | | |
|---|---|---|---|---|
| (17) | (a) | həli? | > | həli?+tx$^{w}$ |
| | | "alive" | | "cure s.o." |
| | (b) | laǰ | > | laǰ+tx$^{w}$ |
| | | "remember" | | "remind s.o." |
| | (c) | šuɬ | > | šuɬ+tx$^{w}$ |
| | | "see" | | "show" |

In each of these examples, as in (16), the causer of the process can be clearly separated from the process itself: in (17a) the causer is not the one who lives, just as in (b) or (c) it is a second participant, not the trajector, who remembers or sees. By the same token, in those causatives formed from verbs of motion, the causer is construed to be somehow outside the process which it initiates, the motion of its landmark.

Of course, the notion of being directly or immediately involved in a process is purely a matter of construal: in many languages verbs like "bring", "take", and "show" are normal transitives. Even in Lushootseed there is considerable overlap in the domains of first- and second-order causation:

| | | | | |
|---|---|---|---|---|
| (18) | (a) | həd?iẇ+d | : | həd?iẇ+tx$^{w}$ |
| | | "take sth inside" | | "take sth inside" |
| | (b) | sula+d | : | sula+tx$^{w}$ |
| | | "place sth in centre of room" | | "bring sth to centre of room" |
| | (c) | ƛ̓ub+əd (ƛ̓ub = well) | : | ƛ̓ub+tx$^{w}$ |
| | | "agree to sth" | | "get sth fixed" |
| | (d) | ?upu+d | : | ?up̓+tx$^{w}$ |
| | | "seat s.o. on one's lap" | | "seat s.o. on another's lap" |

While some of these examples, like (a) and (b), seem completely synonymous, others, like (d), show a subtle semantic distinction that parallels exactly the sense of *-tx$^{w}$* illustrated by (16) and (17) above. It may well be that the remainder of these pairs contrast only in the degree to which the trajector is felt to be an immediate participant in the second-order process that affects the theme; the idiomatic *ƛ̓ubtx$^{w}$* "get sth fixed" in (18c), for instance, removes the trajector from the action that causes the landmark to become "well". For (a) and (b) a similar distinction may hold and the English glosses may simply be unable to reflect a subtle distinction of construal.

### 3.4 *-dx$^{w}$* "[lack of control]"

The category of "control" or "inadvertence" is an important feature of Lushootseed inflection. "Lack of control" is expressed by adding the suffix *-dx$^{w}$* to the radical, forming a transitive verb in

which the trajector or initiator of the action chain is seen to have less than total control over the event or its outcome. These verbs seem to fall into two distinct semantic classes, the first of which can be glossed roughly as "result achieved with difficulty". Consider the following:

| | | | | |
|---|---|---|---|---|
| (19) | (a) | bək$^{w}$+əd | : | bək$^{w}$+dx$^{w}$ |
| | | "take everything" | | "manage to take everything" |
| | (b) | huyu+d | : | huy+dx$^{w}$ |
| | | "make, do sth" | | "manage to make, do sth" |
| | (c) | k$^{w}$əda+d | : | k$^{w}$əd+(d)x$^{w}$ |
| | | "take sth" | | "manage to get sth" |
| | (d) | čəsa+d | : | čəs+dx$^{w}$ |
| | | "send s.o. on errand" | | "persuade s.o. to go on errand" |

In the examples in the righthand column in (a) through (c), the subject is seen as having accomplished the task with some difficulty. Similarly, in the second verb in (d) the subject persuades someone else to do something, but *-dx$^{w}$* is required because the subject is not in complete control of the actions or feelings of that other person, although the subject is the principle causer of the event. This can also be seen in another group of verbs which take *-dx$^{w}$* (not all of which have other transitive forms):

| | | | | |
|---|---|---|---|---|
| (20) | (a) | x̌əc | > | x̌əc+dx$^{w}$ |
| | | "be afraid" | | "scare s.o." |
| | (b) | x̌əɬ | > | x̌əɬ+dx$^{w}$ |
| | | "sick" | | "hurt s.o." |
| | (c) | x̌$^{w}$al | > | x̌$^{w}$al+dx$^{w}$ |
| | | "fail" | | "defeat s.o." |

In each of these cases, the radical designates a state which in some way depends on the physical or mental disposition of its trajector. In the righthand examples, where the trajector seeks to cause some other participant to be in this state, the landmark is still felt to have some control over the outcome, either in that it is not amenable to the trajector's intentions (as in (a), where the person the trajector wants to scare may not be frightened) or in that it physically resists the trajector's efforts ((b) and (c)).

The second semantic class of verbs with *-dx$^{w}$* is illustrated by

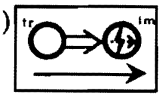
| | | | | |
|---|---|---|---|---|
| (21) | (a) | cili+d | : | cil+dx$^{w}$ |
| | | "dish out sth (food)" | | "put sth on wrong plate" |
| | (b) | bəča+d | : | bəč+dx$^{w}$ |
| | | "set sth down" | | "accidently knock sth down" |
| | (c) | g$^{w}$al+d | : | g$^{w}$al+dx$^{w}$ |
| | | "capsize sth" | | "happen to capsize sth" |

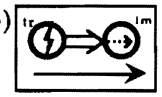
These examples show inadvertence, the event being the result of an action which was either itself undesired or which did not have the desired result—and which therefore was not under the trajector's complete control. Similarly, certain experiencer verbs reflect the non-volitional nature of such things as sight or memory, which are also not completely under conscious control:

| | | | | |
|---|---|---|---|---|
| (22) | (a) | šuɬ | > | šuɬ+dx$^{w}$ |
| | | "see" | | "see sth" |
| | (b) | laǰ | > | laǰ+dx$^{w}$ |
| | | "remember" | | "remember sth" |

Thus, the lack of control morpheme would appear to have two rather different meanings. The apparent tension between the two may arise from a schematic relation between subschemas of the *-dx$^{w}$* morpheme—one in which a deliberate, voluntary action is directed towards an object construed as having partial control of the situation (either by volition or by virtue of being a difficult target for

the action), and a second where the subject has only partial (or negligible) control and causes an event in which the object's will is not an issue. These two subschemas can be represented as (23a) and (b) respectively. The notion "lack of control" is shown by the lightning bolt, which is associated with either the landmark or the trajector of the event, depending on which of the meanings of *-dxʷ* is appropriate to the situation.

(23) (a) 

(b) 


## 4.0 TRANSITIVITY AND VOICE: THE PASSIVE

In contrast to the valency-increasing suffixes we have considered so far, grammatical voice (as defined by Mel'čuk 1993) represents an inflectional category that alters the syntactic roles of the actants of a verb without changing its propositional meaning and, therefore, without changing the number of construed participants in the clause. The most pervasive voice in Lushootseed is the passive, formed by combining a patient-oriented suffix with the middle *-b*, as illustrated in (24):

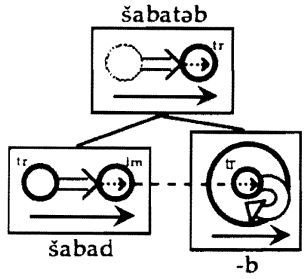
(24) (a) ʔu+ʔuxʷ+c+ə b ʔə ti luʎ̓ ti čačas
[pnt]+go+[appl]+[md] P D old D child
"the old man went after the boy"

(b) ʔu+šaba+t+ə b ʔə tsi luʎ̓ ti sʔuladxʷ
[pnt]+dry+[caus1]+[md] P D old D salmon
"the old woman dried the salmon"

(c) ʔu+ʔuxʷ+tu+b ʔə ti luʎ̓ ti čačas
[pnt]+go+[caus2]+[md] P D old D child
"the old man took the boy somewhere"[9]

(d) ʔu+ʔəy̓+du+b ʔe ti čačas ti sqʷəbayʔ
[pnt]+find+[l.o.c.]+[md] P D child D dog
"the boy found the dog" (Hess 1993a: 29 – 38)[10]

What is especially interesting about the passive here is that it is formed by a combination of suffixes—specifically, by the addition of the middle *-b* to a stem transitivized by a patient-oriented suffix—and as such we should expect it to combine the properties of these morphemes in some way. And indeed it does. As noted earlier, when added to a radical stem, the patient-oriented suffix creates an action chain in which a causer acts on the thematic element (trajector of the radical stem), the causer becoming the grammatical subject and the theme the direct object. When the middle suffix—which prototypically profiles a theme rather than a causer (though in middles these are often the same)—is added to this transitive construction, it shifts the profile of the composite structure to the tail of the transitive action chain, the theme, which then becomes trajector. This suggests the compositional schema in (25), where the *-b* suffix is added to the first-order causative form of the radical *šab* "dry" (*cf.* (24b)).

(25) 

The middle is the profile determinant (indicated by the dark box around it) and thus it a) selects the thematic element (what is dried) as trajector, and b) prevents the profiling of the non-thematic element (not present in the canonical middle), which must then be realized as a prepositional phrase in those cases where it is required in discourse—thereby creating an intransitive clause. Transitives formed on the other patient-orienting suffixes can also be combined with *-b* in this way, each retaining the particular aspects of its own meaning (second-order causativity, lack of control) while taking on the profile required by the middle, although—as in (25)—the resulting structures lose the middle's meaning of "the trajector acting on itself or for its benefit" in favour of the sense "the trajector is acted upon". Once again, the use of the middle in the creation of intransitive—in this case passive, de-transitive—clauses is far from unusual cross-linguistically, the most familiar examples being Spanish expressions such as *aquí se venden libros* "books are sold here", which are formed with the same morpheme, *se*, that also characterizes reflexive and middle constructions in this language.

## 5.0 CONCLUSION

The analysis of the Lushootseed data given above seems to lend a great deal of support both to the hypothesis that there is a close link between transitivity and causation and, in particular, to Langacker's (1991) contention that transitivity finds its conceptual basis in the notion of causal relations between subject and object. Lushootseed is an especially clear example of this principle in that it is a language that expresses what are ordinary transitive clauses in many other languages through the application of valency-increasing suffixes whose meaning includes the notion of causation. The key to understanding this phenomenon almost certainly lies in the unusual nature of Lushootseed radical verb stems, which are—with only a few exceptions—inherently atemporal and non-causative in nature and which, in fact, may not be verbal in any meaningful sense of the term, as they pattern both morphologically and syntactically with words corresponding to the lexical class of adjective in more familiar languages. As a result of this, Lushootseed radicals are inherently monovalent and thus require the addition of suffixes to allow for the additional actants needed to form transitive clauses and to express the minimal sort of causality encoded by transitive subject-object relations. Clearly, the recognition of the role played by the speaker's construal of events and its links to the symbolic functions of the grammatical and morphological processes underlying the structure of clauses offers new insights into these and many other important aspects of natural language; further extension of the type of analysis presented here will no doubt uncover additional evidence for these and for the conceptual links between causation, transitivity, and clause structure that are coded so explicitly in Lushootseed morphology.

## NOTES

* I would like to thank Thom Hess, Ronald Langacker, Igor Mel'čuk, and Leslie Saxon for their help and insightful comments on this paper.This is a shorter version of a more detailed work. A full copy of this paper is available from the author via e-mail (dbeck@epas.utoronto.ca).

1 The following abbreviations are used in this paper: appl = applicative; caus1 = first-order causative; caus2 = second-order causative; D = deictic; *f* = female; lm = landmark; md = middle; pnt = punctual; P = preposition; s.o. = someone; sth = something; tr = trajector. Uncited examples are taken largely from Hess (1976) but also from Hess (1993a) and Hess and Hilbert (1976).

2 In (a), the grammatical subject of the sentence—a third-person NP whose identity would be unambiguous in discourse—has been elided by a surface rule of Lushootseed syntax, preventing the realization of more than a single direct actant (subject or direct object) in a clause.

3 Note, however, that a third-person subject of a patient-oriented stem may not be overt in a matrix clause. When such subjects are not inferable from discourse a passive is used (see section 4).

4 This term is not to be confused with the semantic role "theme" current in the literature.

5 For a more detailed discussion, see Langacker 1991, Chapter 7.

6 The stem-final /u/ in *ʔupusud* is part of the root, but is deleted word-finally and before many suffixes. A very large number of Lushootseed roots follow this pattern (not always with /u/).

7 "Middle" has also been used in the literature to refer to sentences which also fall under the heading "mediopassive" (Trask 1993), as in "This book reads easily". This is not the meaning used here.

8 The notion of possessive domain is derived from Langacker's (1991) "reference-point" model of possession and corresponds to his possessive dominion, or that set of things which the reference-point can be used to locate in conceptual space and which are linked to it by the use of a possessive construction. Hence, "my boss" does not designate possession in the usual sense, but indicates that the boss being discussed may be identified with reference to the speaker, who thus serves as a point of reference. The term possessive domain, however, is (potentially) more limited as it refers to those items in the posession of, or which may be acted upon to the benefit/detriment of, the trajector, although the two concepts are obviously connected.

9 When combined with *-b* in the passive, *-tx*$^{w}$ surfaces as [-tu-] and *-dx*$^{w}$ as [-du-].

10 These examples are glossed as active as the passive serves a different discourse function than it does in English and has the opposite rhematic structure, making an active gloss more idiomatic.

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# HISTORICAL ASPECTS OF COEUR D'ALENE HARMONY

**Susan Fitzgerald**[1]

Department of Linguistics
University of Victoria

## 1.0 INTRODUCTION

Although the synchronic analysis of a language is often presented with little or no reference to the language's history, there are cases in which knowledge about the development of the language can provide valuable insight into its synchronic processes. The analysis of Coeur d'Alene harmony is such a case; the interaction of stressed vowels and faucal consonants can be better understood by the investigation of comparative data. In this paper, I discuss three aspects of Coeur d'Alene harmony which are of both synchronic and diachronic interest. A comparison of Coeur d'Alene with five other Interior Salish languages reveals at least partial answers to questions concerning Coeur d'Alene's synchronic harmony.

Because Reichard's (1939) transcription of Coeur d'Alene is not in a standard orthography, there has been debate over what the phoneme inventory of Coeur d'Alene is, especially with respect to vowels. Following Doak (1987:66, 1992:2), I assume the vowel inventory of Coeur d'Alene to be *i, ɛ, ɔ, u, o,* and *a*, where *ɛ* and *ɔ* represent *e* and *o* respectively.[2] Sloat (1968a) was used to convert Reichard's transcription of consonants to a more familiar system.

### 1.1 Regressive Harmony

Coeur d'Alene regressive (anticipatory) harmony is triggered by uvular and pharyngeal consonants (*q, q', qʷ, q'ʷ, χ, χʷ, ʕ, ʕ', ʕʷ, ʕ'ʷ*) and by *r* and *r'*; these are referred to collectively as "faucals" (Doak 1992:3). A faucal consonant causes a preceding stressed vowel to retract. In morphemes with */u/* and */ɛ/*, the assimilation process is straightforward as seen in (1) (the relevant vowels are underlined):

(1) a. *s-pu̲m* 'fur, feathers (on animal)': *spómalqs* 'fur coat' (Doak 1992:4)
b. *ʕɛ̲w* 'drop': *stʕa̲wʕəwpus* 'tears drop' (Doak 1992:29)

When followed by a faucal, *u* and *ɛ* retract to *o* and *a*, respectively.

If the root or suffix vowel is *i*, however, the situation is more complicated. Consider the examples in (2):

(2) a. *qʷɪ̲c* 'warm': *qʷácqɔn* 'hat' (Doak 1992:3)
b. *cɪ́st* 'it is long': *cɛ́salqʷ* 'he is tall' (Sloat 1968b:234, Doak 1992:3)

In (2a), the faucal causes *ɪ* to become *a*. As (2b) shows, however, in some morphemes, *ɪ* changes to *ɛ*. Although *ɪ* has two harmony variants, a given root or suffix has only one. There are no environmental criteria determining the choice of harmony variant. For example, both *kʷɪn* 'take, carry' and *kʷɪʔ* 'bite' take *a*, and both *t-kʷɪnc* 'how many' and *qɪʔ* 'stick to, wedge to' take *ɛ*, showing that neither the preceding nor the following consonant governs the harmony alternation.

All of the above examples involve root or suffix vowels assimilating to faucal consonants in suffixes. However, the distribution of vowels in roots which themselves contain faucals indicates that regressive harmony also occurs within roots. Thus, as shown in (3), we find the harmony vowels *ɛ, o,* and *a* occuring in roots with a following faucal:

(3) a. *leq'* 'to bury,' *č'eʕʷ* 'pray,' *p'ɛr* 'overflow, flood'
b. *c'or* 'sour,' *y'oqʷ* 'tell lie,' *ɬoq'* 'be bald, bare'
c. *caʕ* 'scream,' *kʷaχ* 'claw,' *naʔq'* 'rot, rotten'

But there are no roots of the shapes **CiF* or **CuF*, where *F* represents a faucal consonant. Because a regressive harmony rule is needed to account for the data in (1) and (2), roots containing faucals "can be postulated as having underlying *i u* (or underived *ɛ*)" (Doak 1992:5), even though these vowels never surface. The rule will cause the underlying vowels to retract.

1.2 Progressive Harmony

Although Coeur d'Alene progressive (lag) harmony is not obviously triggered by faucals, it is similar to regressive harmony. Certain roots containing */a/* or */o/* cause a stressed suffix vowel to retract; hence, these roots are called "retracting roots" (Doak 1992:4). The distribution of variants is the same as that in regressive harmony, except that since no suffix with */ɛ/* receives stress, the alternation of *ɛ* and *a* does not occur. Thus, *u* retracts to *o* (4a), and *i* retracts either to *a* (4b) or to *ɛ* (4c):

(4) a. *-us* 'eye, face; fire': *ceɬhəstp'əc'ósəm* 'I will squirt him in the eye' (Doak 1987:81)
b. *-ɪčt* 'hand, finger': *čyəc'yəc'amáčtəm*: 'hold on tight' (Doak 1987:85)
c. *-s-čɪnt* 'person': *t'apsčént* 'he shot people' (Doak 1992:4)

A given suffix will always have the same harmony vowel. Thus the *i* in *-ɪčt*, seen in (4b), consistently retracts to *a*:

(5) *-ɪčt*: *xʷɛmáčt* 'woodpecker' (Mattina 1979:23), *aməl'áčtmənčəlis* 'he is making us too warm' (Doak 1987:86)

Finally, not all roots with *a* or o trigger regressive harmony. Thus, it seems that harmony is not caused by the root vowel itself, but by some other property of the root.

The vowel alternations caused by Coeur d'Alene harmony are summarized in (6):

(6)

| Non-Harmony Vowels | Harmony Vowels | |
|---|---|---|
| | Regressive | Progressive |
| *u* | *o* | *o* |
| *ɛ* | *a* | - |
| *ɪ* | *a* | *a* |
| *i* | *ɛ* | *ɛ* |

1.3 Questions Raised by Coeur d'Alene Harmony

The synchronic vowel assimilation in Coeur d'Alene raises at least three questions of diachronic interest. First, is there evidence that would explain why some roots with *a* and *o* trigger progressive harmony while others do not? Second, is there any historical evidence that the vowels which surface in roots with faucals are the harmony variants of */ɪ/*, */ɛ/* and */u/*, rather than the regular surface representations of */a/* and */o/*? Finally, does comparative data reveal why *i* has two harmony variants? The answers to these questions also provide insight into Coeur d'Alene synchronic harmony.

2.0 RETRACTING ROOTS

In this section, I briefly discuss Coeur d'Alene retracting roots. Recall from section 1.2 that the effects of progressive harmony are the same as those of regressive harmony, although the roots involved do not contain faucals. As Mattina (1979) shows, the historical development of these roots provides an explanation for this phenomenon. Processes similar to Coeur d'Alene progressive harmony occur in other Interior Salish languages. In Colville, when a root with a pharyngeal occurs with a stressed suffix, the pharyngeal moves to the suffix and the stressed vowel is lowered. In Spokane, Kalispel and Shuswap, roots cognate to Coeur d'Alene retracting roots also cause suffix vowels to be lowered.[3]

Mattina constructs cognate sets with these roots, and finds that in most cases, the Colville root has the shape *CʕVC*. More recent Spokane data show that two of the Spokane cognates have alternate forms with a pharyngeal as $C_2$: *p'ac'(sta)* ~ *p'ʕac'(á)* 'loose bowels' (cognate with Mattina's set 13) and *p'at'(á)* ~ *p'ʕat'(á)* 'substance in gravy-like form' (cognate with Mattina's 16).

Mattina suggests that the retracting roots are reflexes of Proto-Interior Salish roots of the shape **CʕVC*, and that in Pre-Colville, "pharyngeal movement ... was at one time a regular morphophonemic process, and that, for reasons still unknown, the pharyngeal of the root was occasionally lost" (Mattina 1979:18 and 24). Perhaps Coeur d'Alene, Spokane, and Colville represent three stages of lexical diffusion (as defined by Wang (1969)),[4] in which a sound change affects only a number of words at a time, rather than applying to all eligible items at once. In Coeur d'Alene, the sound change is complete and all retracting roots have lost the pharyngeal; in Spokane, only a few pharyngeals remain; and in Colville, only a few roots have been affected by the change.

In all of these languages, the effects of the pharyngeals remain, even if the consonants themselves have been lost. In her synchronic analysis of Coeur d'Alene retracting roots, Doak (1992:20) posits a floating

pharyngeal feature which triggers vowel harmony. Thus, the slots which the pharyngeals occupied have been lost, but the features of the pharyngeals have not. The historical development of these roots clearly provides support for such an analysis.

## 3.0 ROOTS WITH FAUCAL CONSONANTS

As mentioned in section 1.1, Doak suggests that roots which have a faucal can be posited as having */i/*, */e/*, and */u/*, and the regressive harmony rule will cause *e*, *a*, and *o* to surface. However, she does not mention that since *a* and *o* can occur underlyingly, it is possible that these roots actually have */a/* and */o/*. This section addresses the question of whether roots with a faucal consonant following the vowel have developed differently from those without a faucal. For example, since *e* is the regular Coeur d'Alene reflex of Proto-Interior Salish **ə* (Kinkade and Sloat 1972:38), and *e* is also the harmony variant of *i*, are roots with *e* before a faucal reflexes of roots with **ə* or with **i*? If the historical development parallels the synchronic analysis, then we would expect that, before a faucal, Coeur d'Alene *o* reflects **u*, *e* reflects **i*, and *a* reflects either **i* or **ə*.

Many of the cognate sets in this and the following sections were constructed by using those found in Kinkade and Sloat (1972), Kinkade and Thompson (1974), Kinkade's unpublished cognate list, and Mattina (1979) as a starting point; appropriate references are given for these sets.[5] Additional members were added by searching the lexicons of Coeur d'Alene (Reichard 1939), Kalispel (Vogt 1940), Spokane (Carlson and Flett 1989), Okanagan (Mattina 1987, through Kinkade, p.c.) and Shuswap (Kuipers 1974).

### 3.1 Roots with *o*

Synchronically, Coeur d'Alene *o* can be the surface realization either of */u/* or of */o/*. Because *u* never occurs in roots with a following faucal, it is possible for a root with the shape *CoF* to have either *u* or *o* as its underlying vowel. Since *o* is the harmony variant of *u*, and *u* is the regular reflex of PIS **u*, we might expect that *o* before a faucal consonant also reflects **u*. Consider the cognate sets in (7):

(7) a. Cr *s-xʷəl-ótqən* 'jackrabbit;' Cm *sxʷəl'ú̲tqs* 'cottontail;' Ka *sxʷəl'óqs* 'prairie rabbit;' Sp *s-x̣ʷl'=ót=qs* 'cottontail rabbit' (KS 330)

b. Cr *y'o̲qʷ* 'tell lie;' Ka *yo̲qʷ* 'to tell lies;' Sp *yo̲qʷ* (s) 'to lie'

c. Cr *do̲q'ʷ* 'wood is rotten;' Sp *yo̲q'ʷ* ~ *yóq'ʷiʔ* 'general term for decayed wood;' Sh *yʔu̲q'ʷ* 'rotting, rotten'

d. Cr *nóx̣no̲x̣* 'spouse;' Cm *nú̲x̣ʷnux̣ʷ*, Ka *nóx̣ʷənx̣ʷ*, Sp *nóx̣ʷno̲x̣ʷ* (s) 'wife;' Sh *nu̲x̣ʷ-ux̣ʷ* 'female.' Residue: Ok *nú̲x̣ʷnəx̣ʷ* 'wife' (KS 232)

e. Cr *c'ó̲r* 'sour;' Ka *c'o̲l* 'salt, sour.' Residue: Cm *c'ə̲́r* 'sour, salty;' Sp *c'u̲r* (s) 'salty, sour;' Sh *c'a̲lt* 'bitter, sour, salty' (KS 589, KT 1 (PIS **c'úr*), Ku I and II 40)

The sound correspondences seen in these sets are summarized in (8). Vowels from forms that are included as full members of the sets are shown in bold type, and those from residue forms are given in regular type:

(8)

| Faucal | Cr | Cm | Ka | Sp | Ok | Sh | Examples |
|---|---|---|---|---|---|---|---|
| q | **o** | **u** | **o** | **o** | | | 7a |
| qʷ | **o** | | **o** | **o** | | | 7b |
| q'ʷ | **o** | | | **o** | | **u** | 7c |
| x̣ | **o** | **u** | **o** | **o** | a | **u** | 7d |
| r | **o** | ə | **o** | u | | a | 7e |

Kalispel is the only language with completely regular correspondences to Coeur d'Alene *o*. The Columbian and Shuswap residue forms in (7e) may represent a *ə*-grade variant, although there is no independent evidence for this. Note that the only irregular Spokane reflex occurs before *r* (7e); further evidence that *r* is not treated the same as the other faucals in Spokane is seen in section 3.3 (this was also noted by Kinkade and Thompson (1974:24)).

The following table shows the reflexes of **u* preceding a faucal consonant given by Kinkade and Sloat (1972:35), Kinkade and Thompson (1974:24) and Kuipers (1970:51):[6]

(9)

| | Cr | Cm | Ka | Sp | Ok | Sh |
|---|---|---|---|---|---|---|
| KS | o | u | | | | |
| KT | o | u | o | o | [ɔ] | u |
| Ku | o | | o | | | u |

All of the regular correpsondences in (8) agree with the above reflexes. With the exception of the residue forms, then, we can say that the forms in (7) go back to roots with **u*.

3.2 Roots with *ɛ*

A Coeur d'Alene root with *ɛ* before a faucal can have only *i* as its underlying vowel. If */ɛ/* were posited, the regressive harmony rule would cause *a* to surface. The historical development of *ɛ* in such roots parallels the synchronic analysis. Cognate sets are given in (10):[7]

(10) a. Cr *pɛ́q*, Cm *pɨ́q-*, Ka *pɨq*, Sp *pɨq* (v), Sh *pɨq* 'white' (KS 236, Ku II 3.3)

b. Cr *lɛ́q'*, Cm *lɨ́q'-*, Ok *lɨ́q'-*, Sh *lɨq'-m* 'bury.' Residue: Ka *láq'*, Sp *láq'* 'bury' (KS 238)

c. Cr *t'ɛ́qʷ*, Cm *t'ɨ́qʷ-* 'explode, shoot, go off;' Sp *t'ɨqʷ-* 'small, bursting sound;' Ok *t'ɨ́qʷ-* 'burst, explode.' Residue: Sh *t'qʷ-up-t* 'explode (tire, firecracker), go off (firearm)' (KS 239, Ku II 25.1)

d. Cr *ʔɛ́tɨxʷɛʔ* 'camas;' Cm *ʔɨ́tɨxʷaʔ* 'black camas;' Ka *ʔɨ́tɨxʷɛʔ* 'cooked camas;' Sp *ʔɨ́tɨxʷɛʔ* 'camas (black, blue, or brown) after baking;' Ok *ʔɨ́tɨxʷaʔ* 'camas' (KS 245)

e. Cr *tə-pɛ́xʷ*, Cm *ptɨ́xʷ*, Ka *pɨtáxʷ*, *pɨtxʷ-*, Ok *sptɨ́xʷ*, Sh *ptɨxʷ-m* 'to spit.' Residue: Sp *ptaxʷ* (s) 'to spit' (KS 243, Ku I 1)

A summary of the sound correspondences is presented in (11):

(11)

| Faucal | Cr | Cm | Ka | Sp | Ok | Sh | Examples |
|---|---|---|---|---|---|---|---|
| q | e | i | i | i | | i | 10a |
| q' | e | i | a | a | i | i | 10b |
| $q^w$ | e | i | | i | i | ∅ | 10c |
| $x^w$ | e | i | i | i | i | | 10d |
| $x^w$ | e | i | i | a | i | i | 10e |

There is more irregularity in this group than in that reflecting **u*. Kalispel and Spokane have *a* in (10b), and Spokane also has *a* in (10e). Other sets show Okanagan zero and Shuswap *ɛ* and *a* possibly corresponding to Coeur d'Alene *ɛ*. For the most part, however, Coeur d'Alene *ɛ* corresponds to *i* in the other languages.

The reflexes of **i* before a faucal consonant posited by Kinkade and Sloat (1972:31), Kinkade and Thompson (1974:24) and Kuipers (1970:51) are shown in (12):

(12)

| | Cr | Cm | Ka | Sp | Ok | Sh |
|---|---|---|---|---|---|---|
| KS | e | i | | | | |
| KT | [e^] | [e] | i/a | [e] | i/a | i |
| Ku | e | | e | | | i |

My data show both *i* and *a* in Kalispel, as well as in Spokane, although there is no obvious environment in which each reflex appears. There is no evidence in my data for Kalispel *ɛ*. In addition, my data contain no examples of Okanagan *a*. For those roots in which Coeur d'Alene *ɛ* corresponds to *i* in the other languages, we can reconstruct **i*. Further work is needed to clarify the status of the seemingly irregular correspondences.

3.3 Roots with *a*

Roots with surface *a* before a faucal can be posited as having either */i/*, */ɛ/*, or */a/*, as *a* is a harmony variant of both */i/* and */ɛ/*, and */a/* does not undergo harmony. In Doak's analysis, *ɛ* is the underlying vowel. It is therefore interesting to examine the comparative data to determine whether these roots are reflexes of PIS roots with **i*, **ə* (> *e* in Coeur d'Alene), or **a*.

The relevant cognate sets can be divided into two groups. First, (13) presents those sets in which Coeur d'Alene *a* corresponds to Columbian *a*:[8]

(13) a. Cr *s-pá̲pq-ɬc'e?* 'ermine;' Cm *spá̲pq-ɬc'a?*, Ka *pá̲pqɬc'e?* 'weasel;' Sp *pá̲pq=ɬc'e?* 'weasel (short-tailed)' (KS 4)

b. Cr *x̣á̲q'*, Cm *x̣á̲q'-* 'pay, reward;' Ka *x̣á̲q'* 'to pay for work or favors received;' Sp *x̣a̲q'* (s), Ok *x̣á̲q'-* 'pay;' Sh *x̣e̲q'-n-s* 'to pay for a cure' (KS 7)

c. Cr *ʔá̲c'x̣*, Cm *ʔá̲c'x̣* 'to look at, watch;' Ka *ʔá̲c'əx̣* 'look;' Sp *ʔa̲c'x̣* (s) 'watch, look at.' Residue: Ok *ʕá̲c'x̣-* 'look at' (KS 11)

d. Cr *pá̲x̣* 'rub on rough surface;' Cm *pá̲x̣-* 'scratch, scrape;' Sp *pa̲x̣* (w) 'scratch;' Ok *pá̲x̣-* 'scrape, shave;' Sh *pe̲x̣-m* 'to whittle, plane' (KS 14)

e. Cr *ca̲r-t* 'cold weather;' Ka *c'a̲l* 'ache, hurt, cold;' Ok *c'á̲ɬt* 'cold (of weather).' Residue: Cm *c'əɬt* 'cold;' Sp *c'e̲r* (w) 'ache, hurt, cold' (M 29, Ku I and II 40)

The table in (14) gives a summary of the sound correspondences seen in the above sets:

(14)

| Faucal | Cr | Cm | Ka | Sp | Ok | Sh | Examples |
|---|---|---|---|---|---|---|---|
| q | **a** | **a** | **a** | **a** | | | 13a |
| q' | **a** | **a** | **a** | **a** | **a** | e | 13b |
| x̣ | **a** | **a** | **a** | **a** | **a** | | 13c |
| x̣ | **a** | **a** | | **a** | **a** | e | 13d |
| r | **a** | ə | **a** | e | **a** | | 13e |

Columbian has *ə* corresponding to Coeur d'Alene *a* in (13e). Given that Okanagan has *á* in its form, it is likely that this set belongs here rather than in the group believed to have descended from roots with **ə* (see below). The Kalispel correspondents to Coeur d'Alene *a* seen here are completely regular, although additional data include one form with zero (13d); Okanagan has zero for this form as well. The single Spokane irregularity is found before *r* (13e). Okanagan has *a* in all forms seen here. The Shuswap correspondents are also regular; one form not shown here has zero corresponding to Coeur d'Alene *a*.

Kinkade and Sloat (1972:30), Kinkade and Thompson (1974:24) and Kuipers (1970:51) agree as to the reflexes of **a* preceding a faucal:

(15)

| | Cr | Cm | Ka | Sp | Ok | Sh |
|---|---|---|---|---|---|---|
| KS | a | a | | | | |
| KT | a | a | a | a | a | e |
| Ku | a | | a | | | e |

Aside from the residue forms, my data show the same reflexes. Thus, the members of this group of roots can all be considered to reflect roots with **a*.

The second group of cognate sets are those in which Coeur d'Alene *a* corresponds to Columbian *ə*:

(16) a. Cr *t'á̲q* 'bushy stuff lies;' Cm *t'ə̲́q-* 'pile;' Ka *t'á̲q* 'lay down something;' Sp *t'a̲q* ~ *t'a̲q*$^{w}$ (w) 'piled, bushy;' Ok *t'á̲q-*, *t'q-* 'lay, put' (KS 439)

b. Cr *ɬá̲q'*, Cm *ɬə̲́q'-*, Ka *ɬa̲q'* 'wide;' Sp *ɬa̲q'* (w) 'wide, flat;' Ok *ɬá̲q'-*, *ɬq'-* 'wide, flat.' Residue: Sh *ɬe̲q'-m* 'to spread or stretch a hide' (KS 443)

c. Cr *sá̲q'* 'gape, split in two;' Cm *sə̲́q'*, Ka *sá̲q'-* 'split;' Sp *sa̲q'(é)* (w) 'cracked, split;' Ok *sq'-*, Sh *sə̲q'-*, *sq'-* 'split' (KS 443, Ku I 50)

d. Cr *t'á̲x̣*, Cm *x̌'ə̲́x̣-* 'fast, swift;' Ka *x̌'á̲x̣(t)*, Sp *x̌'a̲x̣* (w), Ok *x̌'á̲x̣(t)* 'fast' (KS 453)

e. Cr *x$^{w}$á̲r*, Cm *x$^{w}$ə̲́rp* 'shake, tremble;' Ka *x$^{w}$a̲l(í)-* 'shake;' Ok *x$^{w}$a̲r-*, *x$^{w}$r(á)* 'shake, shiver;' Sh *x$^{w}$ə̲lɛ́* 'spin around.' Residue: Sp *x$^{w}$e̲r(í)-* (w) 'shake' (KS 436, KT 5 (PIS **x$^{w}$ərə-*))

As seen in table (17), these sets show more irregularities than do those involving other vowels:

(17)

| Faucal | Cr | Cm | Ka | Sp | Ok | Sh | Examples |
|---|---|---|---|---|---|---|---|
| q | **a** | ə | **a** | **a** | **∅, a** | | 16a |
| q̓ | **a** | ə | **a** | **a** | **∅, a** | e | 16b |
| qˀ | **a** | ə | **a** | **a...(é)** | **∅** | **∅, ə** | 16c |
| x̣ | **a** | ə | **a** | **a** | **a** | | 16d |
| r | **a** | ə | **a...(í)** | e...(i) | **∅...(á), a** | **ə...é** | 16e |

Kalispel *a* corresponds to Coeur d'Alene *a* in these data. Spokane again has different vowels before *r* than before the other faucals (16e and additional data). All of the Okanagan forms shown here have either zero (with or without a following *a*) or *a* corresponding to Coeur d'Alene *a*. The most common Shuswap correspondents are zero and *ə*.

Kinkade and Sloat (1972:37), Kinkade and Thompson (1974:24) and Kuipers (1970:51) give the following reflexes for **ə* before a faucal consonant:

(18)

| | Cr | Cm | Ka | Sp | Ok | Sh |
|---|---|---|---|---|---|---|
| KS | a | ə | | | | |
| KT | a | ə | a | a | a | ə/e/a |
| Ku | e | | ə | | | ə |

There is no evidence that Coeur d'Alene *ɛ* corresponds to Columbian *ə*. Nor is there evidence for Kalispel *ɔ*. My data shows only one example of Shuswap *a* corresponding to Columbian *ə* (not given here), and two examples with Shuswap *e* (16b and additional data). Given the regularity of the correspondences between Coeur d'Alene and Columbian, the forms in (16) seem to go back to roots with **ə*.

It is interesting to note that none of the Coeur d'Alene roots with *a* preceding a faucal are reflexes of PEIS roots with **i*, even though *a* is a harmony variant of *i*. All roots from **i* have *ɛ*. Although **a* is reflected in Coeur d'Alene by non-harmony *i*, in roots with a following faucal the surface vowel is always *a*. The development of vowels in roots with faucals can thus be summarized as follows:

(19) a. PIS **u* becomes Coeur d'Alene *u*, which becomes *o* before a faucal;
b. PIS **i* becomes Coeur d'Alene *i*, which becomes *ɛ* before a faucal;
c. PIS **a* becomes Coeur d'Alene *i*, which becomes *a* before a faucal; and
d. PIS **ə* becomes Coeur d'Alene *ɛ*, which becomes *a* before a faucal.

Thus, when the vowel and the faucal occur in the same root, the harmony variant of *i* can be determined by the proto-vowel.

Regarding the synchronic analysis of these roots, positing */i/* for those reflecting **i* (which have the harmony variant *ɛ*) and for those reflecting **a* (which have the harmony variant *a*) requires that we stipulate which roots have which harmony vowel. A simpler solution may be to posit */i/* for those roots which reflect **i*, and */a/* for those which reflect **a*. The regressive harmony rule will change */i/* to *ɛ* and leave */a/* unaffected.

## 4.0 HARMONY ACROSS MORPHEME BOUNDARIES

In this section I discuss the historical development of Coeur d'Alene stressed vowels which participate in harmony across morpheme boundaries. The data given in this section include cognate sets for only those Coeur d'Alene morphemes which have been specified by Doak (1992), Reichard (1939), or Mattina (1979) as undergoing harmony, in order to avoid false statements about roots which do not participate in harmony.

### 4.1 Non-Harmony Vowels *u* and *ɛ*

The behaviour of morphemes with *u* with respect to faucal harmony is uncomplicated; they have only one harmony variant, *o*. We would thus expect the historical development to be straightforward as well. Due to space limitations, I do not give cognate sets involving such morphemes; however, my data indicate that their proto-forms can all be reconstructed with **u*.

Kinkade and Sloat (1972:36), Kinkade and Thompson (1974:24) and Kuipers (1970:51) all state that the languages in their studies retain **u* when it precedes a non-faucal consonant:

(20)

| | Cr | Cm | Ka | Sp | Ok | Sh |
|---|---|---|---|---|---|---|
| KS | u | u | | | | |
| KT | u | u | u | u | u | u |
| Ku | u | | u | | | u |

Except for a single irregularity in Kalispel and Spokane, my data agree with their predictions.

As with *u*, *ɛ* has only one harmony variant, *a*. Relevant cognate sets are given in (21):

(21) a. Cr *čɛ́ɬ* 'separate, divorce, part;' Cm *kə̱ɬ-* 'part, divide;' Sp *čɬ* (w) 'separate;' Sh *kɬ-* 'come off, come apart,' *kə̱ɬ-* 'divorce;' Ok *kɬ(á)-* 'split in two.' Residue: Sh *kɨ́ɬ* 'come off, come apart, be released' (KS 549)

b. Cr *lɛ̱ǰ*, Cm *lɨ̱y-* 'stab, poke, sting;' Ok *lγ* 'put in, poke;' Sh *lγ(é)-* 'put, stick into'

c. Cr *p'ɛ̱́n*, Cm *p'ə̱́n-*, Ka *p'ɨ̱́n* 'long object lies (pl.);' Sp *p'ɨ̱n* (v) 'long objects lying on the ground;' Ok *p'n-* 'put down several long objects' (KS 520)

d. Cr *šɛ̱́lč* 'move in a circle;' Cm *xə̱́lk-* 'spin, turn;' Sp *šl(í)č* (w) 'to turn;' Ok *xlák-*, *xlk-* 'whirl, roam.' Residue: Ka *šə̱lč* 'turn around' (KS 532)

e. Cr *t'ɛ̱́l'*, Cm *t'ə̱́l'-*, Ka *tɨ̱́l* 'tear, rip;' Sp *t'l'(í)* (w) 'to break, to tear;' Ok *t'l(á)-* 'tear open.' Residue: Sh *t'ɨ̱lxʷ-m* 'to rip something at the seam' (KS 542)

The correspondences seen in the cognate sets are summarized in (22):

(22)

| Cr | Cm | Ka | Sp | Ok | Sh | Examples |
|---|---|---|---|---|---|---|
| e | ə | | ∅ | ∅...(á) | ∅, ə | 21a |
| e | i | | | ∅ | ∅...(é) | 21b |
| e | ə | i | i | ∅ | | 21c |
| e | ə | ə | (í) | ∅, ∅...(á) | | 21d |
| e | ə | i | ∅...(í) | ∅...(á) | i | 21e |

The correspondence between Coeur d'Alene *ɛ* and Columbian *i* seen in (21b) is a regular one, occurring before *y*, *y'*, *d*, or *ǰ*. Kalispel has *ə* instead of *i* in (21d). All of the Spokane forms have zero or *ɨ*, except for two not shown here, which have *ɛ*. Most of the Okanagan forms have zero, which is sometimes followed by *a*. As before faucals, the most common Shuswap correspondents to Columbian *ə* are zero and *ə*.

The following table gives posited reflexes of **ə* when it does not precede a faucal (Kinkade and Sloat 1972:38, Kinkade and Thompson 1974:24, Kuipers 1970:51):

(23)

| | Cr | Cm | Ka | Sp | Ok | Sh |
|---|---|---|---|---|---|---|
| KS | e | ə | | | | |
| KT | e | ə | i | i | a | ə/a |
| Ku | e | | ə | | | ə |

Although Kalispel has one form with *ə*, its regular reflex seems to be *ɨ*. My data contain only one example of Shuswap *a*. Aside from a few irregularities, it appears that the forms in (21) reflect etyma with **ə*.

4.2 Non-Harmony Vowel *i*

The most interesting case of harmony across morpheme boundaries involves those morphemes in which the non-harmony vowel is *i*.[10] since it has two harmony variants, *a* and *ɛ*. Given that before tautomorphemic faucals it is possible to predict the harmony variant based on the proto-vowel, we would hope to find that those morphemes with the harmony vowel *a* are reflexes of PIS morphemes with **a*, and those with *ɛ* reflect etyma with PIS **i*. This, however, is not the case.

First, consider those morphemes for which the harmony vowel is *a*:

(24) a. Cr *kʷɨ̱́ʔ*, Cm *kʷə̱́ʔ-*, Ka *kʷɛ̱́ʔ*, Sp *kʷɛ̱ʔ(é)* (w) 'bite;' Sh *kʷɛ̱ʔ(é)-* 'chew.' Residue: Ok *kʷa̱ʔ(á)-* 'bite' (KS 197)

b. Cr *kʷɨ̱́n*, Cm *kʷə̱́n-* 'take, carry (sg. obj.);' Ka *kʷɛ̱́n-* 'take (sg.);' Sp *kʷɛ̱n ~ kʷɛn(é)* (v) 'to take;' Ok *kʷɨ̱́n* 'take;' Sh *kʷɛ̱n* 'to go and get, take (hold of)' (KS 156, Ku II 79.1)

c. Cr *qʷɨ̱́c-t*, Cm *qʷə̱́ʔc* 'warm;' Ka *qʷɛ̱́c* '(comfortably) warm;' Sp *qʷɛ̱c* (s), Sh *qʷɛ̱c* 'warm.' Residue: Ok *qʷə̱́c-* 'warm' (KS 150)

d. Cr *tɨ̱́ʔ* 'pound, hit;' Cm *tə̱́ʔ-* 'mash;' Ka *tɛ̱ʔ*, Sp *tɛ̱ʔ(é)* (w) 'pound;' Sh **tɛ̱ʔ* 'to pound.' Residue:

Ok *ta̲ʔ-*, *tʔá-* 'crush' (KS 196)

e. Cr *-í̲tkʷeʔ*, Cm *-á̲tkʷ*, Ka *-e̲tkʷ*, Sp *-e̲tkʷ*, Sh *-e̲t-kʷe* 'water.' Residue: Ok *-ʔí̲tkʷ* (KS 206)

The following table gives the correpsondences for these sets:

(25)

| Cr | Cm | Ka | Sp | Ok | Sh | Examples |
|---|---|---|---|---|---|---|
| **i** | **a** | **e** | **e...(é)** | **(a)...(á)** | **e...(é)** | 24a |
| **i** | **a** | **e** | **e, e...(é)** | **i** | **e** | 24b |
| **i** | **a** | **e** | **e** | **a** | **e** | 24c |
| **i** | **a** | **e** | **e...(é)** | **∅...(á),a** | **e** | 24d |
| **i** | **a** | **e** | **e** | **i** | **e** | 24e |

The correspondences between Coeur d'Alene, Columbian, Kalispel and Shuswap are completely regular. So too are the Spokane correspondents: *ɛ...(é)* occurs with weak roots, *ɛ* and *ɛ...(é)* with the one variable root, and *ɛ* with strong roots and suffixes. Okanagan has *i* in (24b) and (24e), but has forms with *a* as either the first or second vowel in most of the other sets in my data.

For Coeur d'Alene, Columbian, Kalispel, Spokane and Shuswap, my data agree with the following proposed reflexes of **a* (Kinkade and Sloat 1972:30, Kinkade and Thompson 1974:51, Kuipers 1970:51):

(26)

| | Cr | Cm | Ka | Sp | Ok | Sh |
|---|---|---|---|---|---|---|
| KS | i | a | | | | |
| KT | i | a | e | ɛ | i | e |
| Ku | i | | e | | | e |

My data suggest that *a* may also be an Okanagan reflex of **a*. It may be significant that Okanagan forms with *a* as the second vowel correspond to weak roots in Spokane. It seems reasonable to reconstruct roots with **a* for the sets in (24).

We can predict, then, that if the non-harmony vowel is *i* and the harmony vowel is *a*, the proto-vowel was **a*. Unfortunately, the converse of this statement does not hold; a morpheme reflecting **a* may have *ɛ* in the harmony environment.

The sets which contain Coeur d'Alene morphemes for which the harmony vowel is *ɛ* can be divided into two groups. First, the sets in which Coeur d'Alene *i* corresponds to Columbian *a* are given in (27):

(27) a. Cr *dík'ʷ*, Cm *yák'ʷ-* 'cross.' Residue: Ok *yak'ʷ* 'cross over water' (KS 191)

b. Cr *q'íʔ* 'stick to, wedge into;' Cm *q'áʔ-* 'stick in, push in;' Ka *q'ɛʔ* 'put, stick;' Sh *q'ɛʔ* 'put, stick into; add.' Residue: Ok *q'əʔáʔ, q'aʔ-* 'get stuck' (KS 198)

c. Cr *q'íy'*, Cm *q'áy'* 'cleft, angle;' Sp *q'ey* (s) 'split, forked' (KS 179)

d. Cr *síg'ʷ* 'ask for;' Cm *sáw-* 'ask;' Ka *séu* 'ask for information;' Sp *sew* (s), Ok *siw-*, Sh *sew-n-s* 'to ask.' (KS 147)

e. Cr *ʕíd* 'glow, become red hot;' Cm *ḥáʔi* 'hot;' Sh *ʕéy-*, *ʕy-* 'stinging, hot' (KS 177)

These sets exhibit the same types of correspondences seen in (25):

(28)

| Cr | Cm | Ka | Sp | Ok | Sh | Examples |
|---|---|---|---|---|---|---|
| **i** | **a** | | | **a** | | 27a |
| **i** | **a** | **e** | | **a/ə...(á)** | **e** | 27b |
| **i** | **a** | | **e** | | | 27c |
| **i** | **a** | **e** | **e** | **i** | **e** | 27d |
| **i** | **a** | | | | **e/∅** | 27e |

Although the Coeur d'Alene harmony variant for these roots is *ɛ*, the proto-vowel appears to have been **a*.

The second group contains those sets in which Coeur d'Alene *ɛ* corresponds to Columbian *i*:

(29) a. Cr *cí̲l*, Cm *cí̲lkst*, Ka *cí̲l*, Sp *ci̲l* (w), Ok *cí̲l(ə)kst*, Sh *ci̲l-kst* 'five' (KS 285, Ku I 30)

b. Cr *t-k'ʷi̲nc*, Cm *k'ʷí̲nx*, Ka *k'ʷí̲nš* 'how many;' Sp *k'ʷi̲nš* (w) 'several;' Ok *k'ʷí̲nx* 'how much, how

many;' Sh *k'ʷi̲nx* 'how many (objects), several.' Residue: Ok *k'ʷnx-* 'how much, how many' (Ku I 84)

c. Cr *ni̲c'*, Cm *n'i̲k'-*, Ka *ni̲c'* 'cut with blade;' Sp *ni̲c'* (s) 'to cut;' Ok *ni̲k'-* 'cut with a knife;' Sh *ni̲k'-m* 'to cut, saw' (KS 295, Ku II 53.1)

d. Cr *-ci̲n*, Cm *-ci̲n* 'mouth;' Ka *-ci̲n*, Sp *-ci̲n* 'mouth, lips, tongue; speech; food;' Sh *-ci̲n* 'mouth, voice' (KS 312)

e. Cr *-i̲c'ɛʔ* 'all around, all over;' Cm *-i̲c'aʔ* 'blanket, skin, hide;' Ka *-i̲c'ɛʔ* 'all around;' Sp *-i̲c'ɛʔ* 'blanket, outside covering of something;' Sh *-i̲c'ɛʔ* 'surface, hide' (KS 94, 311, Ku I 146)

The correspondences in the above sets are almost completely regular, as shown in (30).

(30)

| Cr | Cm | Ka | Sp | Ok | Sh | Examples |
|---|---|---|---|---|---|---|
| i | i | i | i | i | i | 29a, 29c |
| i | i | i | i | i/∅ | i | 29b |
| i | i | i | i | | i | 29d,29e |

The only exception is the Okanagan form with zero in (29b).

As would be expected from the correspondences in (30), Kinkade and Sloat (1972:34), Kinkade and Thompson (1974:24) and Kuipers (1970:51) state that all of the languages retain **i* when it precedes a non-faucal consonant:

(31)

| | Cr | Cm | Ka | Sp | Ok | Sh |
|---|---|---|---|---|---|---|
| KS | i | i | | | | |
| KT | i | i | i | i | i | i |
| Ku | i | | i | | | i |

The proto-forms for the sets in (29) can thus be posited as having **i*.

In my data, five of the Coeur d'Alene forms with non-harmony *ɪ* and harmony *ɛ* reflect etyma with **a*, while seven descend from forms with **i*. Within each group, the sound changes are regular. An interesting point revealed by this comparison is that all *suffixes* with *ɪ* < **a* have *a* as their harmony vowel, while those with *ɪ* < **i* have *ɛ*. This may be a coincidence of the data, and should be investigated further. For roots, at least, it is not possible to explain the two harmony variants of *ɪ* by referring to the proto-vowels. It is plausible that at one time the harmony pattern across morphemes was the same as that seen in tautomorphemic harmony environments. That is, it may have been the case that *ɪ* < **a* always had the harmony variant *a*, and *ɪ* < **i* always became *ɛ* in a harmony environment, as shown schematically in (32):

(32) a. **a* > *ɪ* — *a*/___F
b. **i* > *ɪ* — *ɛ*/___F

Perhaps, for some instances of (32a), the harmony vowel has changed to *e* by analogy with the (32b) cases:

(33) **a* > *ɪ* — *e*/___F

This would be less likely to occur in roots which contain a faucal, since *i* is never realized on the surface and analogy between roots which always have the shapes *CaF* and *CɛF* would not be obvious. This would provide a further indication that those roots with a faucal preceded by *i* < **a* should not be posited as having */ɪ/*, even though *i* is the regular Coeur d'Alene reflex of **a*. If *CaF* roots are underlyingly *CaF*, and *CɛF* roots are underlyingly *CiF*, then the two types would differ in both underlying and surface representations, and no analogy would be made.

### 4.3 Conclusion

The case of Coeur d'Alene harmony is clearly one in which an investigation of comparative data leads to a better understanding of the modern language. Such data provide valuable insight into the reasons behind the behaviour of retracting roots, and suggest that the loss of pharyngeals in Interior Salish languages is an example of lexical diffusion. With respect to forms containing a faucal consonant after the vowel, it is possible to predict the harmony vowel based on the proto-vowel. Although this is not true when the vowel and faucal are not in the same morpheme, it may be that prediction was possible at one time, but has been rendered impossible by analogy.

This study has also highlighted the need for further investigation into the behaviour of Spokane vowels before **r*, into developments of **ə*, especially in Okanagan and Shuswap, and into the reflexes of **i* in roots with faucals in Kalispel and Spokane. In addition, much of the Coeur d'Alene data used in this paper is based on Reichard (1939), which does not always agree with Reichard (1938) with regard to vowel alternations (Kinkade, p.c.) Therefore, it would be worthwhile to verify the harmony vowels reported in Reichard (1939), and to re-examine the comparative evidence in light of any new information.

## NOTES

[1]Many thanks to Dale Kinkade and Barry Carlson, who provided numerous comments on earlier versions of this paper. This work was supported in part by a Social Sciences and Humanities Council of Canada Doctoral Fellowship.

[2]For alternative analyses, see Sloat (1968b, 1980), Kinkade and Sloat (1972), and Bessell (1990).

[3]For detailed discussions of these processes, see Vogt (1940), Kuipers (1974), and Mattina (1979).

[4]For an overview of the theory of lexical diffusion, see Labov (1981).

[5]Throughout this paper, the number of cognate sets given to illustrate each of the correspondence types has been limited to five. In most cases, my data contain additional examples. The following abbreviations are used: Cr - Coeur d'Alene, Cm - Columbian, Cv - Colville, Ka - Kalispel, Sp - Spokane, Ok - Okanagan, Sh - Shuswap, PEIS - Proto-Eastern Interior Salish, PIS - Proto-Interior Salish, and PS - Proto-Salish; Kn - Kinkade's cognate list, KS - Kinkade and Sloat (1972), KT - Kinkade and Thompson (1974), M - Mattina (1979), Ku I - Kuipers (1970), and Ku II - Kuipers (1982). Numbers given in the references are from the original sources.

[6]Vowels given in brackets by Kinkade and Thompson (1974) "are lower allophonic variants of higher vowels." Kinkade and Sloat reflexes are for PEIS proto-vowels, Kinkade and Thompson for PIS, and Kuipers for PS.

[7]For the Spokane data in this and the following sections, "w," "v" and "s" are used to specify whether a root is weak, variable or strong (see Carlson and Flett (1989)).

[8]See Kinkade and Sloat (1972:31) for further examples.

[9]See Kinkade and Sloat (1972:37) for further examples.

[10]I hesitate to refer to this as "underlying *i*," given the debate over the synchronic analysis of Coeur d'Alene harmony. Hence I will refer to the vowel that occurs in non-harmony environments as the "non-harmony" vowel.

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# TONE SPACE AND TONE FEATURES

**Baoning Fu**

Department of Linguistics
Simon Fraser University

## 1.0 INTRODUCTION

Tone space is the pitch range within which all the tonal contours of a language are confined. In the study of the interrelationship between tone and intonation, it is well known that only part of the voice range is used for tone purposes. J. Shen (1985) points out that intonation affects tonal pitch indirectly through successive tonal ranges. Thus, although tonal range varies constantly, the relationship between successive tones remains constant. X. S. Shen (1990) argues that in Mandarin the intonation baseline as well as the topline is movable, and that the major cue differentiating statement intonation from question intonation does not only lie in the final section of the intonation contour, but rather it is the tone space as a whole that is raised in questions. From this, X. S. Shen suggests that there exist two layers of intonation in Mandarin, an upper layer for questions and a lower layer for statements.

In addition to the raising or lowering of the tone space as a whole, the tone space can also expand or shrink due to different emotions of speech. This phenomenon is observed in N.-C. T. Chang's study of Chengdu Mandarin (1958). Chengdu has four citation tones. Tone I starts between mid-high and mid and rises to high, roughly [35]. Tone II starts somewhere lower than mid and ends between mid-low and low, roughly [31]. In emphatic sentences, Tone I 'remains high-rising and ends yet higher than its normal pitch in an ordinary statement'; Tone II 'falls yet lower'. In sentences implying a dismissal of the topic, 'the range is narrow; therefore the rising and falling of the tones are very slight.'

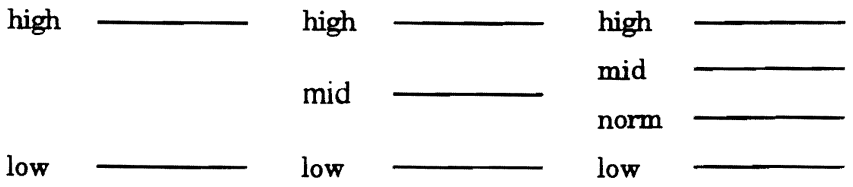
All the above studies point to the fact that tone space is limited. In fact, such a limit has been recognized in the literature for a long time. It is generally believed that the maximum number of tone levels any language can distinguish is five (Wang 1967; Maddieson 1978b). It is found that the perceptual distance between tones decreases as the number of tones in a system increases (Hombert 1978). But although the recognition of the limit of tone space is not new, there has been no explanation, as far as I know, as to what determines this limit.

This paper deals with three issues concerning the notion of tone space. Section 2 discusses the relationship between tone space and the number of tone heights in a language. Section 3, based on the hypothesis of tonogenesis, attempts to explain the existence of the limit of tone space in terms of the pitch-affecting limit of the consonants. Section 4 discusses the significance of the tone space in the construction of a distinctive feature system of tone.

## 2.0 TONE SPACE IN RELATION TO THE NUMBER OF TONE HEIGHTS

There are two opposing hypotheses in the literature regarding the relationship between the overall tone space and the number of tone levels in a system. The older hypothesis holds that a language with two levels of tone tends to have a wider space between the two than the space between each of the levels in a four-level system. In other words, with the increase of the number of tone heights, the overall tone space tends to stay the same with the space between each level compacted. This can be called the 'tone-height compression' view. Pike (1948), for example, holds this view. He illustrates the relationship between the overall tone space and the number of tone heights with the following figure:

(1) Tone-height compression (Pike 1948:6):




A more recent hypothesis holds that the overall tone space is smaller in a system with a smaller number of tone heights than a system with a larger number of tone heights. In other words, tone space tends to expand with the increase of the number of tone heights. This view can be called the 'tone-space expansion' view. Maddieson (1978b) illustrates this view with the measurement of the tone space in six tone languages as shown below:

(2) Tone space as a function of the number of tone heights (Maddieson 1978b)

| TWO LEVELS | | THREE LEVELS | | | | | FOUR LEVELS |
|---|---|---|---|---|---|---|---|
| SISWATI | KIOWA | YORUBA I | THAI I | THAI II | TAIWANESE | YORUBA II | TOURA |
| | | | | | | | +50 |
| | | +26 | +28 | +32 | +32 | +52 | +30 |
| +18 | +22 | +16 | +16 | +16 | +18 | +27 | +10 |
| +0 | +0 | +0 | +0 | +0 | +0 | +0 | +0 |

(2) shows the difference in Hz between each tone and the lowest tone in each system. This difference demonstrates that tone space tends to expand as the number of tone heights increases. From this, Maddieson concludes that 'A larger number of tone levels occupy a larger pitch range than a smaller number.'

Maddieson's conclusion is supported by Painter (1978). Painter compares the $F_0$ plots for Sindhi, a non-tone language, with the $F_0$ plots for two tone languages, Yoruba and Gã, and finds that the Sindhi plots show a small variation about the mean (±5 Hz), while the Yoruba and Gã plots show considerably more variation (20-30 Hz).

Maddieson's conclusion is partly supported and partly refuted by Hombert's study (1978). Hombert develops a model in which the notion of minimum articulatory difficulty and maximum perceptual distance is used quantitatively to predict the phonetically optimal tone systems from universal phonetic considerations.[1] Based on this model, a perceptual experiment is carried out to determine the perceptual distance between the two closest tones as a function of the number of tones in the system. The number of tones ranges from two to eight. The following two findings are of particular interest to our discussion here (p.140): (i) The distance between high and low is smaller in a two-tone system than in a system with a greater number of tones, suggesting tone-space expansion; (ii) Tone space does not expand with the same rate as the number of tones increases from three to four, or from four to five. Rather, as the number of tones increases, the perceptual distance between tones tends to decrease, suggesting tone-height compression.

The result of Hombert's experiment thus suggests that both tone-space expansion and tone-height compression are at work when the number of tones increases in a system. This result is in line with historical evidence which shows that languages with a large number of tones are unstable and that merger between tones is likely to occur (Haudricourt 1961). In a system of tone features, then, both expansion and compression should be incorporated. We will return to this issue in Section 4.

## 3.0. THE LIMIT OF TONE SPACE

One of the findings of Hombert's study (1978) discussed above is that as the number of tones in a system increases, the minimum perceptual distance between each tone decreases. With respect to this tendency, Hombert remarks:

> The flattening of the curve obtained for seven and eight tone systems indicates some sort of saturation in the tone space. A huge number of tone systems are then found to be perceptually equivalent. This implies high instability. These data are in agreement with the fact that it is extremely rare to find tone languages with seven or eight tones using only $F_0$ to distinguish these tones.

The saturation of the tone space suggests that there is a limit as to how far tone space can expand. Without such a limit, there will be no saturation, no instability, and no merger; and the number of tone heights will not be limited to five. In fact, the idea that tone space is limited is assumed in almost all the works dealing with tone. As early as 1930, Chao wrote with respect to his famous tone-letter notation which divides the tone space into five levels, 'as the intervals of speech-tones are only relative intervals, the range 1-5 is taken to represent only ordinary range of speech intonation, to include cases of moderate variation for logical expression, but not to include cases of extreme emotional expression.' Here, a clear distinction is made between tone space and the voice pitch range. But although the limit of tone space is generally assumed in the literature, the reason for such a limit, as far as I know, has not been explicitly explained. This section explores this issue along the lines of the tonogenesis hypothesis (Haudricourt 1954, 1961; Matisoff 1970, 1973).

The tonogenesis hypothesis assumes that tonal distinctions originate historically from consonantal distinctions. In many Southeast Asian languages, the tonogenesis process consists of two stages. In the first stage, syllable-final consonants gave rise to three types of tonal contours. More specifically, a syllable-final glottal stop gave rise to a rising contour; a syllable-final sonorant gave rise to a mid level tone; and a syllable-final -h gave rise to a falling contour.[2]

(3) Pattern of tonogenesis (Haudricourt 1954)

| | | |
|---|---|---|
| pɑʔ | > | pɑ́ |
| pɑ | > | pɑ |
| pɑh | > | pɑ̀ |

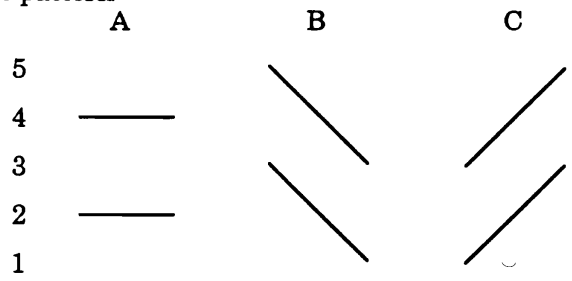
In the second stage, syllable-initial consonants induced tonal split, such that each of the former three tones split into a higher and a lower variant, giving rise to a six-tone system. An ideal system with a two-way split is represented by the Fengxian dialect spoken in a suburb of Shanghai, where no tone overlapping occurs. In (4), A, B, and C represent three historically older tones, each of which has split into two tones in modern Fengxian, conditioned by two different types of syllable initials, which are represented by I and II.

(4) Two-way tone split in Fengxian (Pan 1982:368)

i) Tone values

| | A | B | C |
|---|---|---|---|
| I | 53 | 44 | 35 |
| II | 31 | 22 | 13 |

ii) Tone pattern




Since tone split is conditioned by syllable initials, the limit of the tone-space expansion can be explained in terms of the pitch-affecting limit of the initials. Data from various phonetic experiments can be interpreted as supporting the existence of such a limit.

Hombert (1975) studies the effect of voicing on $F_0$ at different frequency ranges in Yoruba. Yoruba is a tone language with three contrasting tones: high, mid, and low. (5) shows the time course of $F_0$ variation after voiced and voiceless unaspirated velar stops produced by two Yoruba speakers.

(5) Pitch variations after [k] and [g] in Yoruba (Hombert 1975:44)

| | TIME IN MSEC | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 0 | 20 | 40 | 60 | 80 | 100 | 150 | 200 |
| HIGH TONE | | | | | | | | |
| after [k] | 186.1 | 176.3 | 174.7 | 175.4 | 175.8 | 175.2 | 174.0 | 172.7 |
| after [g] | 142.6 | 159.0 | 166.1 | 171.0 | 173.8 | 175.6 | 175.2 | 172.3 |
| MID TONE | | | | | | | | |
| after [k] | 164.9 | 151.6 | 149.2 | 149.0 | 148.4 | 148.8 | 148.4 | 147.8 |
| after [g] | 134.3 | 145.1 | 148.3 | 149.5 | 150.6 | 151.5 | 150.7 | 149.6 |
| LOW TONE | | | | | | | | |
| after [k] | 153.0 | 137.0 | 132.6 | 128.2 | 123.9 | 120.2 | 115.0 | 106.6 |
| after [g] | 121.6 | 130.7 | 130.9 | 129.7 | 126.3 | 122.4 | 117.8 | 113.6 |

This experiment shows that 'the perturbation caused by a voiced consonant on a following high tone or by a voiceless consonant on a following low tone is greater than the effect of these two series of consonants on a mid tone' (Hombert 1977:178). This means that the more the tone space expands, the stronger the opposite forces to balance the expansion.

A similar tendency exists in Siamese (Gandour 1974), where it is found that the raising effect of the voiceless consonants is at its weakest at the top of the tone space, and the lowering effect of the voiced consonants is at its weakest at the bottom of the tone space. Siamese has five tones, High, Mid, Low, Rising, and Falling. (6) shows the averaged $F_0$ values after voiceless and voiced stops for three tones. The onset value refers to the initial fundamental frequency value after the release of the stops; the peak value refers to the highest fundamental frequency value after the release of voiced stops. The result shows that 'the distance of the fall in pitch...varies depending on the initial height on the following vowel. The longer falls in pitch tend to occur before lower pitch heights, the shorter falls in pitch before higher pitch heights' (Gandour 1974:343).

(6) Pitch values after voiced and voiceless stops in Siamese (Gandour 1974:342)

| | [p t] | [b d] | |
|---|---|---|---|
| | onset | onset | peak |
| High | 146 | 123 | 132 |
| Mid | 136 | 120 | 126 |
| Low | 136 | 109 | 114 |

The Yoruba and Siamese examples show that although the impact of initial voicing on the $F_0$ of the following vowel is evident at different frequency ranges, the effectiveness of such an impact differs according to the pitch height of the vowel. The raising effect of the voiceless consonants is weaker on a higher tone than on a lower tone; conversely, the lowering effect of the voiced consonants is weaker on a lower tone than on a higher tone. Such correlations between pitch and voice clearly suggest the existence of a limit beyond which a voiceless/voiced distinction ceases to affect pitch.

Not only does a voicing distinction affect pitch, but pitch variation also affects the perception of voicing. Experimental studies of the latter also suggest that pitch variations caused by a voicing distinction are limited.

Haggard, *et al.* (1970) conduct a perceptual experiment to determine the effect of $F_0$ on the perception of the voiced/voiceless distinction. The test material is a synthesized syllable ambiguous between [bi] and [pi]. Superimposed on the initial 55 msec of this syllable are three $F_0$ trajectories, falling, level, and rising. These trajectories start at 308, 201, and 145 Hz, respectively, and all terminate at 201 Hz. The initial section is followed by the steady-state vowel, the $F_0$ of which is at 201 Hz for 50 msec and then gradually falls to 165 Hz. The perceptual experiment shows that the high falling trajectory generates more [p] responses, the low rising trajectory more [b] responses, and the level pitch generates an equal frequency of [b] and [p].

Massaro and Cohen (1977) conduct a series of perceptual tests to evaluate the effects of frication duration, voice onset time, and $F_0$ on the perception of voicing. In their experiments, synthesized [si] and [zi] are presented to a number of subjects. Massaro and Cohen demonstrate that as the $F_0$ value at the vowel onset increases, there is an increased chance that the synthesized sounds are perceived as starting with an [s]. (7) shows the result of their 1977 experiment.

(7) The effect of $F_0$ values on the perception of voicing (Massaro and Cohen 1977:379)

| | $F_0$ (Hz) | | | |
|---|---|---|---|---|
| Subject | 163 | 183 | 206 | 224 |
| 1 | .33 | .40 | .58 | .69 |
| 2 | .27 | .43 | .61 | .73 |
| 3 | .24 | .44 | .56 | .69 |
| 4 | .34 | .45 | .56 | .64 |
| 5 | .31 | .43 | .55 | .72 |
| 6 | .28 | .39 | .55 | .80 |
| Average | .30 | .42 | .57 | .71 |

These two perceptual experiments demonstrate that given a wide enough range, pitch variation can help to determine the status of voicing or even override a voicing distinction. The significance of this is that the effect of consonants on pitch can be counterbalanced by the effect of pitch on consonants.

Such a balancing force has both diachronic and synchronic consequences on phonological systems cross-linguistically. Maddieson (1978a) has a summary of consonantal changes conditioned by pitch. The following are some examples taken from that study. In Korana, spoken in South Africa, */g/ and perhaps other voiced consonants have become devoiced when followed by high tones. In Kuwaa spoken in Liberia, /k͡p/ is realized as [g͡b] before a low tone. In Tankhur Naga spoken in North-Eastern India, /p, t, k/ become voiced intervocalically especially before a low tone.

To summarize, the above studies all point to the fact that the effect of consonants on the pitch of vowels is limited to a narrow range. To explain the limit of tone space in terms of the limit of consonant effect is not to deny that tone space can also be affected by active pitch control. Since different emotions may either expand or reduce the width of tone space, the actual tone space varies constantly in actual speech. But since this kind of variation is synchronic and does not permanently affect tone space, it should not be considered as a determining factor of the limit to tone space.

## 4.0 TONE SPACE AND TONE FEATURES

As far as the relationship between tone space and the number of tone heights is concerned, previously proposed tone-feature systems are either based on the 'tone-height compression' view, or the 'tone-space expansion view'. Representative of the former approach is Wang's system (1967), which contains seven features as shown below:

(8) Wang's feature system (Wang 1967)

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ˥ | ˩ | ˧ | ˦ | ˨ | ˥˧ | ˧˥ | ˥˨ | ˨˩ | ˩˥ | ˧˦ | ˦˧ | ˨˩ |
| [contour] | – | – | – | – | – | + | + | + | + | + | + | + | + |
| [high] | + | – | + | – | – | + | – | + | – | + | – | + | – |
| [central] | – | – | + | + | + | – | – | – | – | – | – | – | – |
| [mid] | – | – | – | – | + | – | – | – | – | – | – | – | – |
| [rising] | – | – | – | – | – | + | + | – | – | + | + | + | + |
| [falling] | – | – | – | – | – | – | – | + | + | + | + | + | + |
| [convex] | – | – | – | – | – | – | – | – | – | – | – | + | + |

As seen in (8), the feature [high] plays a pivotal role in Wang's system: it divides the tone space into two sub-ranges, within which all contour tones are confined. That is, a contour tone is either [+high] or [–high], and no contours cross the mid pitch line. With respect to tone space, Wang says, "No matter how many tones a language has, the voice pitch traverses approximately the same overall range... The greater the number of distinct tones in the paradigm, the narrower the phonetic range of each tone would be" (1967:100). This view can be illustrated with the following figure, which is based on figure 2 in Wang's paper (1967:101):

(9) Tone-height compression expressed in distinctive features

<table>
<tr><th>2 levels</th><th>3 levels</th><th>4 levels</th><th>5 levels</th></tr>
<tr><td rowspan="4">+high</td><td rowspan="2">+high<br>–central</td><td rowspan="2">+high<br>–central</td><td>+high<br>–central<br>–mid</td></tr>
<tr><td rowspan="3">+high<br>+central<br>–mid</td></tr>
<tr><td rowspan="3">+central</td><td rowspan="2">+high<br>+central</td></tr>
<tr><td rowspan="4">–high</td><td rowspan="2">–high<br>+central<br>+mid</td></tr>
<tr><td rowspan="2">–high<br>+central</td><td rowspan="2">–high<br>+central<br>–mid</td></tr>
<tr><td rowspan="2">–high<br>–central</td><td rowspan="2">–high<br>–central</td></tr>
<tr><td>–high<br>–central<br>–mid</td></tr>
</table>

The immediate consequence of this formulation is that the same features cover different pitch ranges in different paradigms. The range covered by [+central] grows with the increase of the number of tone heights within a paradigm. The feature [+high] covers half of the total range in paradigms with two and four levels, but less than half in paradigms with three and five levels. In other words, the features [high] and [central] do not have fixed values with respect to tone space. It

is therefore unclear how the variation of [high] can be reconciled with the fact that this feature functions to restrict all the tonal contours within half of the tonal tone space in (8).

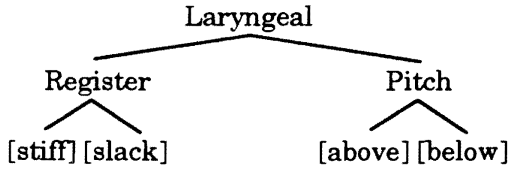
Representative of the 'tone-space expansion' view is Maddieson (1970). As seen above, Maddieson argues against the 'tone-height compression' view, claiming instead that with the addition of tone height, tone space expands. His system captures tone-space expansion, but cannot express tone-height compression:

(10) Tone-space expansion expressed in distinctive features (Maddieson 1970)

| | [Raised] | [Lowered] | [Extreme] |
|---|---|---|---|
| extra high | + | – | + |
| high | + | – | – |
| mid | – | – | – |
| low | – | + | – |
| extra low | – | + | + |

As seen in Section 2, since both tone-space expansion and tone-height compression occur as the result of tone split (i.e., the increase of tone height), a more accurate system should reflect both expansion and compression. One such system is proposed by Duanmu (1990), although Duanmu does not discuss the relationship between tone space and the number of tone heights:

(11) Duanmu's model (1990)




In (11), all the four features are binary. Combinations of [stiff] and [slack] yields a maximum number of three registers, each of which can be divided into three pitch levels yielded by the combinations of the features [above] and [below]. Duanmu's system thus allows nine contrastive tone heights, which is nevertheless not attested in any language.

As we have seen in Section 3, historical tone split may lead to the saturation of the tone space and hence tone merger. This is due to the limit of tone space, which may be the reason why there is no language that distinguishes nine contrastive tone heights. Thus, in the construction of a feature system for tone, the limit of tone space must be taken into consideration.

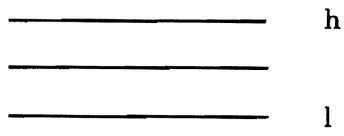
One such system is proposed in Fu (1994a, b; 1995), where both tone-space expansion and tone-height compression are taken care of, and the number of contrastive tone heights is limited to five. This system identifies three registers, with each register further divisible into three tone heights.[3] A key characteristic of this system is to allow register overlapping such that no more than five contrastive tone heights can be generated. This system is constructed as follows.

First, the system consists of two privative features [high] and [low], to be used at both the register tier and the tone tier. These two features are defined as in (12):

(12) The definition of tone features
[high] = to raise the pitch level by one and only one step from the neutral reference pitch.
[low] = to lower the pitch level by one and only one step from the neutral reference pitch.

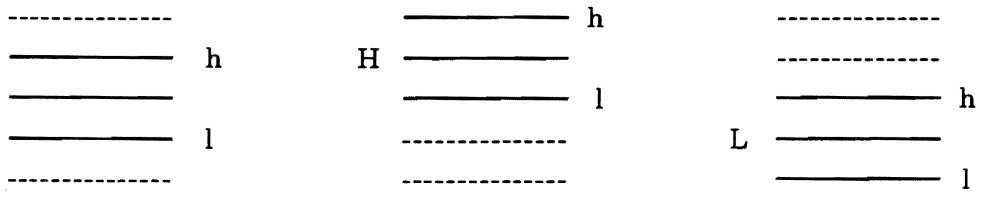
Second, to represent the pattern of tonogenesis given in (3), the two features are applied at the tone tier, giving (13), where the mid tone is left unspecified.

(13) The representation of tonogenesis




Third, to represent the tone split given in (4), the two features are applied at the register tier, giving (14). As the mid tone is unspecified in (13), the mid register is also unspecified in (14).

(14) The representation of register split




In this system, tone-space expansion is captured by the fact that both tonogenesis and tone split are represented as an enlargement of the tonal pitch range. Tone-height compression is captured by register overlapping, as shown in (14), where the mid register partially overlaps with both the upper and the lower registers. Theoretically, this overlapping follows from the definition of the tone feature given in (12). In this way, no more than five contrastive tone heights can be generated by the system.

## NOTES

[1] 'A system was considered perceptually optimum for a given set of input parameters (i.e., number of tones and set of weighting factors) when it was found to have the greatest DMIN [minimal distance] after all possible tone systems with N tones were compared. In other words, the chosen perceptual criteria was to keep the two closest tones of a given system maximally apart.' (Hombert 1978:135).

[2] For verifications of this type of tonogenesis, see Matisoff (1970, 1973), Mei (1970, 1982), Henderson (1982), and Manaster-Ramer (1986). For amendment of Haudricourt's scheme of tonogenesis, see Sagart (1986, 1988).

[3] For the evidence of the existence of three registers, see Chao (1928), Li, *et al.* (1959), Haudricourt (1961), Pulleyblank (1978), Xiong (1979), Edmondson (1992), and Shi (1992).

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# CAN MINIMALISM MEET BINDING THEORY?*

**Michael Gamon**

Department of Linguistics
University of Washington

## 1.0 INTRODUCTION

Chomsky (1993) proposed a Minimalist Program for generative syntax. This Minimalist program diverges from the Principles and Parameters theory in some fundamental ways, some of which are:

- S-structure and D-structure are eliminated as levels of representation.
- Representational conditions on wellformedness operate only at the so-called "interface" levels PF and LF
- Phrase-structure building and movement operations are instances of generalized transformations
- Among a set of possible (converging) derivations for a sentence the most economical one blocks all other derivations
- Movement is driven by the need for checking of morphological features.

It must be emphasized, though, that this minimalist framework as of yet is a research program, not a full-blown theory. Many constructions and problems that have received a fairly neat analysis in the Principles and Parameter approach are open for investigation again, and there is a great amount of problems and open questions that need to be addressed.

Among the issues that need to be dealt with is how to formulate what is known in GB as "Binding Theory" within the Minimalist Program, and this will be the topic of this paper. In the first section I want to show that Chomsky's view on the role of Binding Theory in the minimalist framework as expressed in Chomsky (1993) leads to problems. In the second section I present a tentative general approach to Binding Theory within the Minimalist Program, employing the mechanism of FORM CHAIN, and conditions on chains and on economy of representation.

## 2.0 CHOMSKY'S VERSION OF THE BINDING THEORY IN THE MINIMALIST PROGRAM

At the end of Chomsky (1993) there is a short passage on Binding Theory, and its place in the Minimalist Program. Chomsky claims that Binding Theory should only hold at LF, a necessary consequence of the Minimalist approach and its lack of any level of representation corresponding to D-Structure or S-Structure. Chomsky presents what he calls a "very simple interpretive version of Binding Theory" (Chomsky 1993:43):

> A. If alpha is an anaphor, interpret it as coreferential with a c-commanding phrase in D
> B. If alpha is a pronominal, interpret it as disjoint from every c-commanding phrase in D
> C. If alpha is an R-expression, interpret it as disjoint from every c-commanding phrase

He further comments that condition A may be dispensable under a movement theory of anaphors, and that "all indexing could be abandoned" (Chomsky 1993:43).

In my opinion each of these assertions is questionable, and in the remainder of this section I will present some problems with this approach.

Consider first the fact that Binding theory is reduced to an "interpretive" mechanism. Interpretive mechanisms in the Minimalist approach should operate on the level of LF, that is, right at the conceptual-intentional interface. Interpretive operations are not syntactic in nature, they presumably operate on the output of syntax. They may refer to syntactic structure present at the interface level, and they should not vary cross-linguistically. The formulation of the first two of the three binding principles in Chomsky (1993) contains a "domain D," that is left unspecified. If

Binding Theory is interpretive in nature, this domain D has to be uniform cross-linguistically. This in itself is not a problem: much recent research in Binding Theory has focused on eliminating the need of language-specific domain formulations such as those in Manzini & Wexler (1987). It should be noted, however, that it is suspicious to augment interpretive operations with syntactic locality restrictions. This introduces a fair amount of redundancy: locality plays a central role in the computational system and possibly in conditions on syntactic objects like chains. Syntactic locality in the Minimalist Program is at least in part derivable from economy of derivation and representation. If syntactic locality is also part of interpretive operations, where it is not related to syntactic computation, the relation between locality and economy becomes unclear. In other words, syntactic locality should be a property of the computational system, but not of post-syntactic interpretive mechanisms.

Turning next to a movement analysis of anaphors, another problem - long noted in the literature - emerges. Anaphor movement, which relates the anaphor to its antecedent by movement to a position close to the antecedent (either adjunction to a maximal functional projection or to a functional head) has been argued for in much of the literature on Binding Theory such as Lebeaux (1983, 1984), Pica (1987, 1991), Battistella (1988), Cole/Hermon/Sung (1990), Hestvik (1993), Cole/Sung (1994), to name just some. Anaphor movement analyses face one immediate problem, though: Both long-distance and local anaphors are remarkably immune to movement islands such as adjunct islands, subject islands and coordinated structures as shown in (1)-(8) from English, Icelandic and Chinese:

English:
the anaphor is in an adjunct island
(1) John saw a snake near himself (OK for some speakers, questionable for others)

the anaphor is in a coordinated structure:
(2) John washed the cat and himself

the anaphor is in a subject island:
(3) John and Mary think that each other's cars are junk

Icelandic long distance anaphors: (Thrainsson (1991)):
the anaphor is in an adjunct island:
(4) Jón$_i$ sagði [að hann$_i$ yrði glaður [ef þú hjálpað ir sér]]
John said that he would be glad if you helped self

the anaphor is in a relative clause island:
(5) Jón$_i$ segir [að þú hafir barið konuna [sem hafi svikið sig$_i$]]
John says that you hit the woman that betrayed self

the anaphor is in a complex NP-island:
(6) Jón$_i$ segir [að María trúi ekki [þeirri fullyrðingu [að konan hafi svikið sig$_i$]]]
John says that Mary believes not that claim that the woman has betrayed self

Chinese long distance anaphors: (Cole & Sung (1994)):
the anaphor is in a relative clause island:
(7) Lisi$_i$ kanjian [neige taoyan ziji$_i$ de ren]
Lisi see that dislike self REL person
'Lisi saw the person who dislikes self'

the anaphor is in an adjunct island:
(8) Zhangsan$_i$ shuo [ruguo Lisi piping ziji$_i$] ta jiu bu qu
Zhangsan say if Lisi criticize self he then not go
'Zhangsan said that if Lisi criticized self, then he won't go

If anaphor-movement is modeled after overt clitic-movement, as is often claimed, this fact is unexpected, because clitic-movement never escapes these movement islands as illustrated in (9)-(12) with examples from Spanish:

clitic-movement out of an adjunct island:
(9) *Pablo $lo_i$ quiere dormir [sin leer $t_i$]
Pablo $it_i$-wants sleep without to read $t_i$

clitic-movement out of a relative clause island:
(10) *Pablo $lo_i$ quiere ver [el hombre que conoció $t_i$]
Pablo $him_i$-wants see the man who knows $t_i$

clitic-movement out of a complex NP island:
(11) *Pablo $los_i$ quiere explicar [la creencia de que Juan vio $t_i$]
Pablo $them_i$-wants explain the belief that John saw $t_i$

clitic-movement out of a coordinate structure:
(12) *Pablo $lo_i$ quiere [comprar $t_i$ y dar un paseo]
Pablo $it_i$-wants to buy $t_i$ and take a stroll

Finally, the claim that the abandoning of indices under an interpretive conception of Binding Theory is a welcome result is not too clear. Chomsky (1993:49), in a footnote, offers the following assessment:

*A theoretical apparatus that takes indices seriously as entities, allowing them to figure in operations (percolation, matching, etc.), is questionable on more general grounds. Indices are basically the expression of a relationship, not entities in their own right. They should be replaceable without loss by a structural account of the relation they annotate.*

If indices are not part of a syntactic representation, it is expected that no genuinely syntactic constraints hold on the distribution of indices in a structure. The evidence for just such syntactic constraints on the distribution of indices seems to be very strong, though, as Fiengo & May (1994) have argued. In their framework, indices are taken to be a crucial part of a syntactic structure, playing both a distinct semantic and syntactic role. In particular Fiengo & May's Dependency Theory cannot be recast as an interpretive mechanism, but is syntactic in its very essence.

To summarize: Chomsky's conception of Binding Theory as an interpretive mechanism faces conceptual problems. If the interpretive mechanism refers to local syntactic domains, locality is duplicated in syntax and interpretation, and hence cannot be inherently linked to economy or properties of the computational system. The anaphor movement analysis espoused in the Minimalist Program faces serious empirical problems due to the insensitivity of anaphor movement to movement islands. The elimination of indices from syntactic representations, finally, poses both empirical and conceptual problems.

## 3.0 TOWARDS AN ALTERNATIVE: MAKING USE OF THE MINIMALIST MACHINERY

In the second section I have argued that a movement account of anaphors faces serious problems since the alleged anaphor-movement can cross barriers that are impenetrable for all other kinds of movement. In the Minimalist Program, however, a mechanism already exists that could be utilized to form dependencies without movement: FORM CHAIN. FORM CHAIN is introduced in Chomsky (1993) to solve a problem with two conflicting notions of economy: the notion of fewest steps and the notion of shortest steps. If as few steps as possible are used in a derivation, the steps will necessarily be longer and if the steps are made as short as possible there will necessarily be more steps. To resolve this conflict, Chomsky suggests to treat successive movement as one

monolithic operation FORM CHAIN. FORM CHAIN moves an element successively and creates a chain all in one step, so that the issue of fewest steps does not arise.

I will suggest that FORM CHAIN can operate independently of movement, and that it can be used to form local binding dependencies. As a consequence, binding restrictions can possibly be reduced to conditions on non-movement chains.

I will turn now to arguments in favor of FORM CHAIN as a mechanism independent of movement. The first argument revolves around resumptive pronouns. If FORM CHAIN is linked exclusively to the movement operation, as Chomsky suggests, we would not expect any chain relations to exist between overt elements. This, however, does not seem to be correct: Resumptive pronouns can occupy the base-position of an extracted operator in many languages. (see (Engdahl (1985)) for Swedish, Sells (1984) for Swedish and Hebrew, Shlonsky (1992) on Hebrew and Palestinian Arabic etc.). An example from Swedish is given in (13):

(13) Vilket ord$_i$ visste ingen hur det$_i$ stavas?
which word knew nobody how it is-spelled?

The chain between the wh-operator and the resumptive pronoun cannot be the result of movement, since the base-position of the wh-phrase is occupied by the resumptive pronoun. It is unclear how under the copy theory of movement the original copy of the wh-phrase could be changed into a resumptive pronoun.

Besides the resumptive pronoun argument, there are also arguments from partial wh-movement constructions in German (Gamon (to appear)) and from the mechanics of successive cyclic wh-movement (Zwart (1993b)) in favor of a conception of FORM CHAIN as a mechanism that operates independently of movement. For limitations of space I won't go into those arguments here.

I conclude, then, that FORM CHAIN does operate independently of movement, and in what follows I will try to explore the possible relevance of FORM CHAIN for restrictions on binding relations.

If FORM CHAIN is the relevant operation behind the formation of binding dependencies, we, of course, expect restrictions on binding to be similar or identical to restrictions on other chains. I will focus now on two conditions on chains, namely uniformity and locality. Consider uniformity first: In Chomsky (1994:18) the following condition is imposed on chains:

(14) *A chain is uniform with regard to phrase structure status*

where "phrase structure status" refers to the distinction between heads and maximal projections. Heads are defined as categories which are not a projection at all, and maximal projections as categories that do not project any further (Chomsky (1994:10)).

It is interesting in this context that the same uniformity condition has been argued to hold for binding relations: Progovac (1992) suggests a notion of "Relativized SUBJECT" to account for the differences in binding requirements between morphologically complex local and simplex long-distance anaphors. She claims that $X^0$-anaphors (that is, morphologically simplex anaphors) have to be bound to an $X^0$-antecedent, and that morphologically complex anaphors need XP-antecedents. While the internal structure of anaphors has to be worked out in detail to substantiate an adaptation of this proposal in terms of uniformity, it seems at least suspicious that uniformity of chains and uniformity of binding relations should exist side-by-side, without being linked in some way. If FORM CHAIN is the mechanism that is responsible for establishing the link between an anaphoric element and its antecedent, on the other hand, uniformity is expected to be a property of binding relations. Uniformity can then be viewed as a general restriction on dependencies across a syntactic structure.

Consider locality next. This is, of course, a vast topic, and what I will try to achieve in this paper is only to give some plausibility arguments that chain locality and binding locality may be related. The discussion about locality as applied to binding and movement and a possible unification has been going on for a long time. Attempts at a unification of these constraints have ranged from Aoun's Generalized Binding (1985) and Koster's Domains and Dynasties approach (Koster (1987)) to Manzini's Locality Theory (Manzini (1992)).

In the Minimalist Program, locality and economy are two closely linked notions: the shortest steps requirement on movement is derived from the notion of most economical derivation. Relativized Minimality effects in the sense of Rizzi (1990) are seen as consequences of the violation of economy: if there is a potential closer landing site, a more distant landing site cannot be the target of movement. Unfortunately, the exact formulation of "closer landing site" is very much left open in the Minimalist Program, and Chomsky's notion of "Equidistance", which allows two positions to count as equally "close" from the starting point of movement has been shown to be empirically untenable (Zwart (1993a,b)). Despite these deficiencies and the unsettled nature of locality in the Minimalist Program, some results of Binding Theory may be possible to derive:

- subjects function as opacity factors for local binding of morphologically complex anaphors such as English *himself*:
  If the anaphor has to enter a chain relation with an antecedent, it should enter such a relation in the most economical way, that is with the closest possible antecedent. The fact that anaphors in double object constructions can take both object and subject as an antecedent indicates that specifiers within one Extended Projection of a verb count as equidistant.

- Certain types of Agreement or Tense-heads function as opacity factors for long-distance binding of morphologically simplex anaphors such as Icelandic *sig* or Chinese *ziji*:
  If some suggestions in the literature on long-distance binding are correct, these instances of long-distance binding are results of intermediate head-positions being coindexed. Coindexed Tense-heads in Icelandic subjunctives, and coindexed Agreement-heads in Chinese long-distance binding could be argued to extend the equidistance domain for FORM CHAIN of an $X^0$-reflexive with an $X^0$-antecedent.

To draw an intermediate conclusion at this point: there is some plausibility that restrictions on anaphoric binding can be reduced to uniformity and locality restrictions on chains, the latter being derived from economy.

One problem then is how to deal with "Anti-locality" in Binding Theory, namely Principle B effects. If economy is the driving factor behind locality, what could be made responsible for conditions of the form "if A is coindexed with B, A and B have to be at a certain distance from each other"? Again, the solution can be found in the notion of chains: If chains are obligatorily formed between coindexed elements that stand in a local relation and in a c-command relation to each other, pronouns with local antecedents will form a chain. This chain then violates economy of representation because it is superfluous for interpretation at $LF^1$.

To summarize, the reduction of Binding Theory to chain formation in the Minimalist Program has the following advantages:

- The notion of Relativized Subject for binding follows: Binding, like other chain relations is restricted by the Uniformity Condition. $X^0$-anaphors can only take $X^0$-antecedents, XP-anaphors can only take XP antecedents.
- Locality in anaphoric binding can possibly be reduced to a shortest link condition on chains
- The Antilocality condition on pronominal binding is a result of obligatory chain formation between the pronoun and its local antecedent. The resulting chain violates economy of representation.

The most important questions that need to be answered to make this approach work are:

- what is the correct formulation of minimality and equidistance? In other words, what is the minimalist theory of locality?
- what is the structure of morphologically simplex and morphologically complex anaphors?
- what are the locality restrictions imposed on all chains, and what are the restrictions imposed specifically on movement chains? Note that the arguments against a movement approach to anaphoric binding in the second section of this paper clearly show that binding chains and movement chains cannot be subject to identical locality restrictions. The formal distinction between the two types of chains is easy to capture in the Minimalist framework: Movement chains contain several copies of one and the same element from the numeration, while binding chains contain elements that are distinct in the numeration.
- What is the nature of Principle C? Principle C of standard Binding Theory does not contain any reference to locality, therefore it can hardly be unified with principles A and B under a minimalist approach. One possibility would be to claim that principle C in fact has a different status, (see e.g. Koster (1987), Grodzinsky and Reinhart (1993))[2].

If this approach proves tenable, however, some important goals can be achieved:

- Anti-Locality restrictions do not exist in grammar. Anti-locality effects are the consequence of formation of superfluous chains.
- There are only two modes in which dependencies can be formed: phrase-structure dependencies are formed by generalized transformations, and chains are formed by FORM CHAIN.
- Binding Theory as an independent module is eliminated.

## NOTES

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1 This, of course, needs to be worked out in its technical details. One immediate problem is that under an economy-of-representation approach to illicit chains containing a local antecedent and a non-reflexive pronoun it has to be assumed that indices are not part of the initial numeration. This assumption is necessary because economy conditions chose among converging derivations. If indices are part of the initial numeration, and if these indices force coreference between a non-reflexive pronoun and a local antecedent, there is only one derivation as far as the coindexing/chain formation is concerned, so economy could not possibly rule out that one derivation without alternatives.

2 Alleged parametrization of principle C as presented in Lasnik (1986) for Thai and Vietnamese remains a problem, then.

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# KASHUBIAN – LANGUAGE OR DIALECT?

Paul Hopkins

Department of Linguistics
University of Victoria

## 1.0 INTRODUCTION

Most language variants are readily classified as independent languages (English, French, Japanese, Swahili, etc.) or dialects of a particular language (the Yorkshire dialect of English, the Parisian dialect of French, the Hokkaido dialect of Japanese, the Mombassa dialect of Swahili, etc.). There are, however, some language varieties about which, for a number of reasons, there is controversy as to whether they are independent languages or simply dialects of larger languages. Among these are Galician (said by some to be a dialect of Portuguese), Luxemburgish (said by some to be a dialect of German), Macedonian (said by some to be a dialect of Bulgarian) and Kashubian. It is the status of the latter which will be examined in this paper.

## 2.0 KASHUBIAN – A POLISH DIALECT

Within Poland, where Kashubian is spoken by some 150,000 people living in the countryside to the west of Gdańsk (Topolińska 1980:183), Kashubian has traditionally been regarded as a Polish dialect by most researchers.

### 2.1 The Linguistic Justification

The primary basis for the claim that Kashubian is a Polish dialect, albeit in a "extended sense" of the word (Pniewski 1935/36), is said to be a linguistic one. While the Kashubian dialects do have number of features in common which they do not share with neighbouring Polish dialects, such as non-penultimate word stress, a phonemic schwa, the lack of prepalatal fricatives and affricates, and (reflexes of) a high front oral vowel where typical Polish dialects have reflexes of a high front nasal vowel, most of these distinctive features have been argued by Topolińska (1974) to have developed only within the past five hundred years. In all other respects, Kashubian has developed out of Proto-Slavic just like all the (other) Polish dialects, and hence, it is argued, Kashubian should be treated as a normal, albeit peripheral and thus extremely conservative, Polish dialect.

Linguistic similarity cannot, however, in itself suffice to determine that two language variants are dialects of one language rather than two separate languages. Of course, if two language variants are so similar that they are mutually intelligible to a high degree, we are inclined to consider them dialects of one language, but Kashubian speech – particularly that of speakers of the northern dialects – differs from all (non-Kashubian) Polish dialects to such an extent that it can be understood only with difficulty by speakers of standard Polish.[1] Indeed, tests by Majewicz at the University of Poznań have shown that speakers of standard Polish unsensitized to Kashubian speech can understand a spoken text in Slovak – unambiguously recognized to be a Slavic language distinct from Polish – better than they can one in Kashubian.[2] In any case, there are many examples of language variants whose status as independent languages is unquestioned in spite of being mutually intelligible with other independent languages. With a little sensitization and goodwill, most speakers of Norwegian and Swedish can understand each other's languages, for example, with little difficulty. Most Slavic languages are very similar in number and type of grammatical categories and the percentage of shared vocabulary is very high in comparison with most other Indo-European families. As a result, all Slavic languages are mutually intelligible to a certain extent, and certain pairs (Czech – Slovak, Belorussian – Ukrainian, Slovenian – Serbo-Croatian, Macedonian – Bulgarian[3]) are particularly close. In this context, the fact that Kashubian

cannot be readily understood by Poles should be taken as an indication that Kashubian is not a Polish dialect but a closely related sister language.

## 2.2 Sociological Justifications

Other facts brought forward by Poles to justify calling Kashubian a Polish dialect include the small number of speakers of Kashubian, the fact that Kashubians do not constitute an independent political unity, and the fact that Kashubians themselves say that they are Poles.

The first two of these arguments are clearly based on false assumptions about the diversity of language and a necessary link between ethnic unity and statehood. Many languages have only a small number of speakers; even within the Slavic language family there are variants recognized as independent languages which have fewer speakers than Kashubian, such as Sorbian with its estimated 67,000 speakers (Stone 1993:594-595) and Ruthenian, spoken by some 20,000 people whose ancestors migrated from western Transcarpathia to Serbia two centuries ago (Shevelov 1993:996). And while it is a popular belief in Europe that 'a language is a dialect with an army', there a good 3000 languages spoken today and fewer than 300 states: even taking smaller administrative units such as provinces into account, it remains clear that most language communities do not constitute separate states. Thus, even if it is true that the Kashubians never had an independent country – and this is disputable, as the Pomeranian princes of the tenth through twelfth century were the autonomous rulers of this region even if they did have ties to the Polish court – this cannot be taken as evidence that Kashubian is not a language distinct from Polish.

A more serious obstacle to the recognition of Kashubian as a language distinct from Polish is the fact that Kashubians do not consider themselves an ethnic unit distinct from the Poles.[4] The self-image of a people is important in deciding whether or not their form of speech should be recognized as an independent language. Nevertheless, the social history of that people must also be taken into account, and I suggest that in this context it can be shown that a Kashubian does not think of himself as a Pole in the same sense that a citizen of Warsaw or Kraków does. Although the territory of the Kashubians was part of the politically and culturally autonomous Pomerania until the end of the thirteenth century, during the centuries of German domination the Slavic inhabitants of Pomerania increasingly came to identify themselves as a subgroup of the Poles in order to retain their Slavic identity. In this situation, a bipolar opposition came into being, with the German and Protestantism on one side and Polish and Roman Catholicism on the other. As those Pomeranian Slavs who adopted the Protestant religion were little by little coerced into adopting the German language and culture, those who refused to convert (the ancestors of the present-day Kashubians) increasing turned to their inland cousins for support. In order to gain this support, they naturally portrayed themselves as part of the Polish collective. There was no room in this equation for a separate Kashubian identity. In order to retain their cultural identity, Kashubians had to embed it in the Polish national identity. Thus, when a Kashubian says he is a Pole, he is merely affirming his membership in the Slavic culture which, in his eyes, has room for both Polish and Kashubian as speech forms of different function by potentially equal status. In this way, when a Kashubian author such as Jan Trepczyk (Trepczyk 1980) said that he was a Pole, but his mother tongue was (not Polish but) Kashubian, this should not be seen as a contradiction in terms.

## 2.3 The Political Justification

Polish dialectologists such as Karol Dejna (1992:31) claim not to be influenced by politics in determining that Kashubian is a Polish dialect. This claim is highly suspect given the strong Polish self-identification as a nation-state. When the Polish state was reconstituted at the end of the First World War, its claim to access by sea depended on establishing that the Kashubian region was populated by Poles. In post WW-II Poland, the integrity of the Polish territory has continued to be a topic of great sensitivity. Thus, any suggestion that Kashubian is a separate language has been automatically equated in this century first with an effort by Germans to undermine Poland's right to occupy the Kashubian corridor and then with a desire by "unpatriotic" Kashubians to break up Poland by establishing a separate state. However unfounded this association of linguistic separateness with political separation may be, it has made open discussion of Kashubian's linguistic status

impossible under the communist regime and even now it remains a bogeyman brought out time and again by Poles opposed to the increasing diversity in Polish society advocated by proponents of the Kashubian movement.

## 3.0 ALTERNATIVES TO A BINARY OPPOSITION: DIALECT – LANGUAGE

### 3.1 A Neutral Term

An terminological solution to this controversy has recently been explored by sociolinguists such as Alfred Majewicz (1986). Majewicz notes that the function of the Kashubian language in the society of its speakers is unlike that any Polish dialect: for the speaker of Kashubian, his language is distinct from Polish. While a Kashubian may forego speaking Kashubian for social reasons or to be understood by non-Kashubians, he will not mix it with standard Polish, and he will assign it certain domains of use. Thus, a sub-group of a people can establish its identity as an ethnic group through the use of a specific form of language, its *ethnolect*. This, in Majewicz's view, is the proper characterization of Kashubian.

### 3.2 Another Dimension: *Ausbau* vs *Abstand*

A functional characterization of this problem can also adopt the perspective of the language planner Heinz Kloss, who used the concept of development in function to describe language forms intermediate between the simple dialect and the full language; this terminology was first developed in the context of describing emerging Germanic languages (Kloss 1978) and then in categorizing the written languages of the world (Kloss & McConnell 1989). In this terminology, dialect and language should be distinguished primarily by the extent to which they are used, with a dialect severely limited in the number of domains (functions) where it can be used. From this perspective, Kashubian can be seen an *Ausbau* dialect, or dialect in progress, as Stone (1972) has shown, since it has developed a substantial literature and is used in some formal domains such as the mass media and religious services, but has not developed so far from Polish as to have *Abstand*, or separating distance, from it.

## 4.0 CONCLUSION

Can we finally answer the question posed in the title of this paper? It would seem that the answer is: no. As Majewicz (1986) points out, the classification of languages does not allow for a clear decision in this case. There are valid points of view from which Kashubian can be seen as a Polish dialect. There are also valid points of view from which Kashubian can seen as a language distinct from Polish. This is because Kashubian has developed beyond the status of a simple dialect, yet remains embedded in the Polish cultural and linguistic context. A change in this situation is not foreseeable in the immediate future.

## NOTES

1 Polish is the only language permitted for classroom discussions in all but a very few schools in the Kashubian region. As a result, not only are all Kashubians of school age or older completely fluent in Polish, but most also believe that Polish is a 'better' language than Kashubian. Thus, like speakers of many other minority languages, most Kashubians usually use the a regional form of the majority language, in this case Standard Polish, in the presence of outsiders, so the average Pole will be unlikely to hear much genuine Kashubian without an extended stay in the Kashubian countryside.

2 It should be noted that Standard Polish is based to a large extent on the dialects of Great Poland, spoken in the region adjacent to where south-west Kashubian dialects are presently spoken, and could thus be considered a Polish dialect "close" to Kashubian. On the other hand, dialectal diversity in so great within Kashubian that even a speaker of southern Kashubian has

considerable difficulty in understanding a speaker of the northernmost dialects (unless they use Polish).

3 As mentioned above, Macedonian is one of the languages about whose status as an independent language there is dissent. In particular, the position of linguists in Bulgaria and Greece is that Macedonian is just a dialect of western Bulgarian. Here too, the linguistic features shared by Macedonian and Bulgarian vis-à-vis those of other language variants (such as the Serbian dialects) are taken to "prove" that Macedonian and Bulgarian are but dialects of one language.

4 In recent discussions, Kashubians seem willing to speak of themselves as constituting an *ethnic group*, that is, a group having independent cultural (including linguistic) traditions, but not an *ethnic minority*, which is seen as implying demands for political autonomy.

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# DISTRIBUTIVITY IN CHINESE RECIPROCAL CONSTRUCTIONS*

**Ping Jiang-King**

Department of Linguistics
University of British Columbia

## 1.0 INTRODUCTION

Two hypotheses regarding the nature of distributivity have been proposed in the literature: the "intrinsic" hypothesis (Heim, Lasnik, and May 1991a, b; hereafter, HLM) and the "relational" hypothesis (Williams 1991). The evidence supporting the first hypothesis comes from the problems of ambiguity known as the "grain puzzle" and "scope puzzle" in English reciprocal sentences. HLM (1991a, b) attribute these problems to the insufficient LF representation of plural NPs. In particular, the problem is that plural NPs have identical LF representations to singular NPs: both of them bear only one index. To solve these problems, they propose that plural NPs intrinsically contain a D(istributor) at LF (i.e. $[_{NP}$ NP D]). If D is filled by an overt distributor, the plural NP is interpreted as distributive. Otherwise, it is ambiguous between a distributive and a collective interpretation. In the case of reciprocal sentences, the D is filled by *each* (in *each other*) which contributes the distributive index to the dominating NP (i.e. the NP that dominates both the original NP and D). Therefore, a plural antecedent in reciprocal sentences is always interpreted distributively. Williams (1991), on the other hand, citing data from various kinds of reciprocal constructions, argues against this position. He shows, for example, that a plural NP subject can be interpreted both collectively and distributively with respect to different predicates in a coordinate sentence (e.g. "They collided and criticized each other's driving."). If distributivity is a property of an NP itself, this phenomenon of multiple interpretations for a single NP is unexplained. Distributivity, therefore, is not an intrinsic feature of a plural NP, but "a property of the relation an NP bears to something else" (Williams 1991:163). The issues here are: (i) how to characterize distributivity in general; and (ii) how to obtain the obligatory distributive interpretation for a plural subject of reciprocal sentences in particular.

This paper presents data from Chinese, showing that distributivity in Chinese reciprocal sentences cannot be obtained from either of these two theories. This is because the reciprocalized argument may be lexically empty. I shall propose an analysis that integrates the insights from both hypotheses. In the spirit of HLM (1991a), I claim that distributivity in general is a property of plurals that are derived by Quantifier Raising (QR), following the assumption that QR applies to all NPs (Clark 1992; Abe 1993). Precisely, I assume that QR has two functions: (i) to adjoin a NP to IP, leaving a variable in the original place; (ii) to substitute the NP with a power set containing all individual and subset members (Sauerland 1994). This power set provides exhaustive interpretations and serves as a range for a variable to pick its value from. As a result, three interpretations are available for a plural NP after QR: (i) the distributive reading; (ii) the subgroup reading; and (iii) the collective reading. The effect of excluding/enforcing a particular interpretation lies in the interaction of various factors, presumably, a relation between a predicate and its plural subject following Williams (1991). As for the second issue, I claim that reciprocal elements in both English and Chinese impose a symmetrical relation on a predicate. The obligatory distributive interpretation of the plural subject in reciprocal sentences simply results from the interaction of two assumptions: (i) the reciprocalized argument contains a bound variable (such as *each other* in English and the null argument in Chinese); (ii) the binding condition C applies at LF.

The organization of this paper is as follows. Section 2 explores distributivity in Chinese reciprocal sentences, showing that the problems of ambiguity, known as the "grain puzzle" and the "scope puzzle" in English, are also present in Chinese, even though reciprocals in Chinese differ from those in English in various aspects. Section 3 provides an analysis that incorporates the insight from the previous studies and attempts to account for these puzzles in both languages. The concluding remarks are given in Section 4.

## 2.0 RECIPROCALS IN CHINESE

Reciprocity in Chinese is marked by the word *huxiang* 'mutually'. Traditional analyses treat *huxiang* as an adverb as it occurs preverbally. Its distributional properties are illustrated in (1):

(1) a. women yinggai *huxiang* guanxin, *huxiang* aihu, *huxiang* bangzhu.
we should *mutually* care, *mutually* love, *mutually* help.
We should care about each other, love each other, and help each other.

b. * women *huxiang* yinggai guanxin
we *mutually* should care

c. * women yinggai guanxin *huxiang*,
we should care *mutually*

d. * *huxiang* women yinggai guanxin
*mutually* we should care

(1a) shows that *huxiang* occurs between the modal "yinggai" ('should') and the verb "guanxin" ('care'). The three conjunction VPs "*huxiang* guanxin", "*huxiang* aihu", and "*huxiang* bangzhu" share the same modal "yinggai" ('should'). This suggests that *huxiang* forms a constituent with a VP, and therefore is part of VP. If we put *huxiang* in front of the modal "yinggai", as in (1b), or after the verb "guanxin", as in (1c), or in front of the subject "women" ('we'), as in (1d), ungrammaticality results. This restriction on the distribution of reciprocal *huxiang* to the preverbal position, as well as the impossibility of preposing it to the front of the entire sentence, confirms that *huxiang* is a VP-adverb, assuming that there are two types of adverbs in Chinese: S-adverbs (capable of moving to the beginning of the entire sentence) and VP-adverbs (nonmovable) (Li and Thompson 1981; Cheng 1993). Comparing Chinese *huxiang* with English *each other*, it is clear that reciprocal elements vary from language to language in their syntactic categories and distributional properties.

### 2.1 The Null Reciprocalized Argument

An important property of reciprocal constructions in Chinese is that they allow a null argument in the object position, as shown in (2a). The very same sentence allows an overt object if there is no reciprocal *huxiang*, as in (2b). Moreover, if there is an overt object referring to someone other than the individuals contained in the subject NP, as in (2c), the sentence is ungrammatical.

(2) a. Zhangsan he Lisi *huxiang* zhize ***e***
Zhangsan and Lisi *mutually* criticize ***e***
Zhangsan and Lisi have criticized each other.

b. Zhangsan he Lisi zhize Wangwu.
Zhangsan and Lisi criticize Wangwu
Zhangsan and Lisi have criticized Wangwu.

c.* Zhangsan he Lisi *huxiang* zhize Wangwu.
Zhangsan and Lisi *mutually* criticize Wangwu.

The lack of an overt object in (2a) cannot be attributed to intransitivity of the verb. (3) demonstrates that omission of the object argument without the reciprocal *huxiang* gives rise to ungrammaticality. In addition to the possibility of a null argument, it is also possible for the reciprocalized argument to be the pronoun *duifang* ('other'). This is illustrated in (4) where the pronoun *duifang* is optional.

(3) * Zhangsan he Lisi zhize
Zhangsan and Lisi criticize

(4) Taliang *huxiang* chuipeng (duifang)
both of them mutually please (other)
They please each other.

Comparing the object pronoun in (4) with the object NP in (2c) shows that the reciprocalized argument cannot be a definite NP. It can only be either null or pronominal. That is, the elements in this position must have no referential content. In a double object construction (5), the reciprocalized argument can be either null or the pronoun *duifang* 'other'. In the case of 3-place predicates, such as "introduce" in (6), one of the internal arguments may be reciprocalized, and therefore, may be null.

(5) Women huxiang song le (duifang) yifen liwu.
we mutually give ASP (other) one gift
We gave each other a gift.

(6) Wo gei taliang huxiang jieshao le *e* yixia.
I to them mutually introduce ASP *e* once
I introduced (each other) to them.

What we have shown so far is that the reciprocalized argument in Chinese can be either the pronoun *duifang* or lexically empty. The null argument in the object position is by no means a property of reciprocity, but a characteristic known as pro-drop in Chinese[1].

If the reciprocalized argument can be empty, the question then is how can this null argument get interpreted for its referential content? In other words, there are two questions with respect to the null argument. First, what is its referential content? Second, to which empty category does it belong? The possible referential indices on the null object in (2a) are given in (7) below:

(7) $[[\text{Zhangsan}]_1$ he $[_{NP}\text{Lisi}]_2]_3$ $x$ *huxiang* zhize $e_{1/2/*3/*4}$
Zhangsan and Lisi $x$ *mutually* criticize $e_{1/2/*3/*4}$
Zhangsan and Lisi have criticized each other.

(7) shows that: (i) the null object can only refer to either *Zhangsan* or *Lisi*, but not both; (ii) the null object cannot refer to any individual other than *Zhangsan* or *Lisi*; (iii) if the subject variable $x$ picks the index 1, the null object $e$ can only pick the index 2 and vice visa. In other words, the null object in reciprocal sentences is both anaphoric and non-anaphoric in the sense that it has to refer to an individual contained in the subject NP. In addition it is disjoint in reference from the subject. This suggests that the dual nature of being both anaphoric and referring identified for the reciprocal pronoun *each other* in English by HLM (1991a) cannot be treated as a property of a certain syntactic constituent in English alone, since the null object in Chinese exhibits the same properties. As for the identification of the category this null argument belongs to, there are four types of empty categories according to the standard feature theory of NPs:

(8)

| | | | |
|---|---|---|---|
| NP-trace | [+anaphor, –pron] | PRO | [+anaphor, +pron] |
| WH-trace | [–anaphor, –pron] | pro | [–anaphor, +pron] |

The null argument in reciprocal sentences cannot be an anaphor since it cannot be A-bound by the entire NP *Zhangsan and Lisi*; it cannot be a PRO either since the object is a governed position and PRO theorem requires that PRO must be ungoverned. The remaining options are either pro or variable. If the null argument were a pro, it should be possible for this null argument to pick its reference from the discourse. However, (7) shows that it must refer to the individual contained in the subject NP. Now the only choice left is a variable. If the null argument is a variable, it has to be A-free according to Condition C. This gives the disjoint reading requirement. Meanwhile, this variable can also be A'-bound by the quantified NP to get the bound reading requirement[2], a desirable result.

2.2 The Ambiguity Puzzles

Chinese reciprocal constructions, as with their English counterparts, exhibit the "grain" and "scope" ambiguities. This is illustrated in (9) – (12) below.

(9) Zhangsan he Lisi huxiang tixing (duifang) tamen gai huijia le.
Zhangsan and Lisi mutually remind (other) they should go home ASP
Zhangsan and Lisi remind each other (that) they should go home.

(10) a. Zhangsan$_1$ reminds Lisi$_2$ and Lisi reminds Zhangsan that *they*$_{1+2}$ should go home.
b. Zhangsan$_1$ reminds Lisi$_2$ that *he*$_2$ should go home and Lisi$_2$ reminds Zhangsan$_1$ that *he*$_1$ should go home.

As with the pronoun *they* in "John and Mary told each other that *they* should leave", the embedded subject pronoun *tamen* 'they' in (9) has two interpretations: the collective reading in (10a) and the distributive reading in (10b). The embedded subject pronoun *taliang* 'they' in (11), like the pronoun *they* in "John and Mary think *they* like each other", also has two interpretations, given in (12):

(11) Zhangsan he Lisi renwei taliang huxiang xihuan (duifang).
Zhangsan and Lisi think they both mutually like other
Zhangsan and Lisi think they like each other.

(12) a. Zhangsan and Lisi think they like each other.
b. Zhangsan$_1$ thinks *he*$_1$ likes Lisi and Lisi$_2$ thinks *he*$_2$ likes Zhangsan.

The problem here is that the distributed interpretation in Chinese reciprocals cannot be obtained from either the intrinsic hypothesis or the relational hypothesis. First, under HLM's (1991a, b) theory, distributivity is marked on a plural NP by filling the D position with an overt distributor. Unlike the English reciprocal *each other*, the reciprocalized argument in Chinese is either null or the monomorphemic pronoun *duifang* 'other'. Nothing can be moved to fill the D(istributor) position in the subject NP. Second, under Williams' (1991) theory, distributivity is derived by linking a plural to a singular. However, we do not know whether the null argument or the pronoun "duifang" in the object position is singular or plural until it is linked to its antecedent. In other words, if it is bound by a plural antecedent, it gets a plural interpretation. If, on the other hand, it is bound by a singular antecedent, it acquires a singular reading. In the above examples, we know the their antecedents are grammatically plural, namely, *Zhangsan and Lisi*, therefore, the null argument or the pronoun *duifang* can only get a group interpretation but not a distributive reading. The current theories on distributivity, therefore, are insufficient to derive the distributive interpretation for Chinese reciprocal sentences. Our solution for this is provided in the next section.

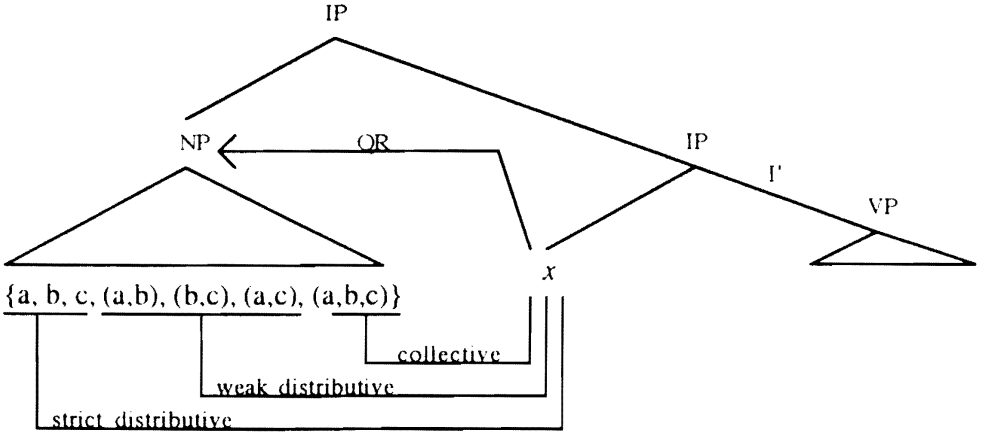
3.0 THE NATURE OF DISTRIBUTIVITY

The questions raised in the debate between the two hypotheses are: (i) how to characterize the distributivity for plural NPs in general; (ii) how to ensure the obligatory distributivity in reciprocal sentences in particular. In this section, I address these two questions and propose an analysis. Following HLM (1991a, b), I treat distributivity as a LF feature that is derived by QR for all plural NPs, assuming that QR applies to all NPs (Abe 1993). Abe argues that all NPs can be treated as quantificational and can undergo Quantifier Raising at LF, leaving a trace in the original place. The traces left by QR are interpreted as variables bound by their antecedents. Assuming that Abe is right, what we need to do is to make explicit exactly what QR does. I assume that QR is a process that does two things: (i) It adjoins a NP to IP, leaving a variable in the original place. (ii) It substitutes the NP with a power set containing all individual and subset members (Sauerland 1994). The whole idea that QR substitutes a plural NP with an antecedent set which contains individuals and subsets is simply a spelling out of Williams' implicit idea that "a plural variable is a variable that ranges over plural entities subsets of some domain" (1991:162). For example, if a NP contains "John and Mary", then QR turns it into a power set {John, Mary, (John, Mary)}[3], shown in (13) below:

(13) LF representation for a plural NP
$[_{IP}\ [_{NP}$\{John, Mary, (John, Mary)\}$]\ [_{IP}\ \ldots x \ldots\ ]]$

If the variable takes {John} or {Mary} as its value, it gets the distributive interpretation. If, on the other hand, it takes the subset {(John, Mary)} as its value, it gets the collective (or "group" in Williams' term) interpretation. A singular NP, however, can only have a singular interpretation since the power set created by QR for a singular NP has only one value, that is, the single individual contained in the original NP. Furthermore, if a plural NP contains more than two individuals, say three here, the antecedent set created by QR could contain all individual members and subsets like {a, b, c, (a, b), (a, c), (b, c), (a, b, c)}. This can be represented graphically in (14) below:

(14) LF representation for an NP with three individuals




(14) shows that a plural NP is potentially 3-way ambiguous: (i) the first three members in the antecedent set will give the variable a strict distributive interpretation; (ii) the middle three subsets will give the variable a weak distributive interpretation, and (iii) the last subset will give it a collective interpretation. This is similar to the intrinsic hypothesis in that distributive interpretation is available for all plural NPs at LF. But our proposal differs from HLM's in two aspects. First, there is no D(istributor) at LF needed in our proposal. The distributive interpretation is solely derived by QR for plural NPs. Second, our solution offers 3-way ambiguity (strict distributivity, weak distributivity and nondistributivity or collective reading), which is exactly what we need in reciprocal sentences (I address this issue below), whereas HLM's theory offers only two-way ambiguity: distributed or none. Also, our proposal, compared with HLM's, is simple with no covert D(istributor) stipulated. The only assumption we need is that QR applies to all NPs which is independently motivated (see Abe 1993 for detailed arguments).

If all plural NPs are potentially 3-way ambiguous with respect to the distributivity, as we proposed above, why is it that a plural subject in reciprocal sentences must not be interpreted collectively, as observed in previous studies (Higginbotham 1980, 1985; Farmer 1987; HLM 1991a, b, Williams 1991, Moltmann 1992, Dalrymple, Mchombo and Peters 1994)? In other words, how can the collective interpretation for plurals in our system be excluded in reciprocal sentences? Following the spirit of Williams (1991) that distributivity has no necessary connection with reciprocals, I propose that distributivity and reciprocity are obtained by different processes: the former is the result of QR for plural NPs, while the latter is the result of predicate-marking by a reciprocal element. The distributive interpretation of a plural NP in reciprocal sentences is seen as a consequence of a conspiracy among several factors, such as QR, the binding condition C, as well as reciprocalization of a predicate.

Before we show how to obtain the obligatory distributive interpretation in reciprocal sentences, four assumptions must be made explicit. First, I assume that the binding condition C applies at LF. Second, I assume that the reciprocal element (such as *each other* in English and *huxiang* in Chinese) imposes a symmetric condition on a predicate. This process can be called "reciprocalization". Third, the reciprocalized argument (which is filled by *each other* in English and

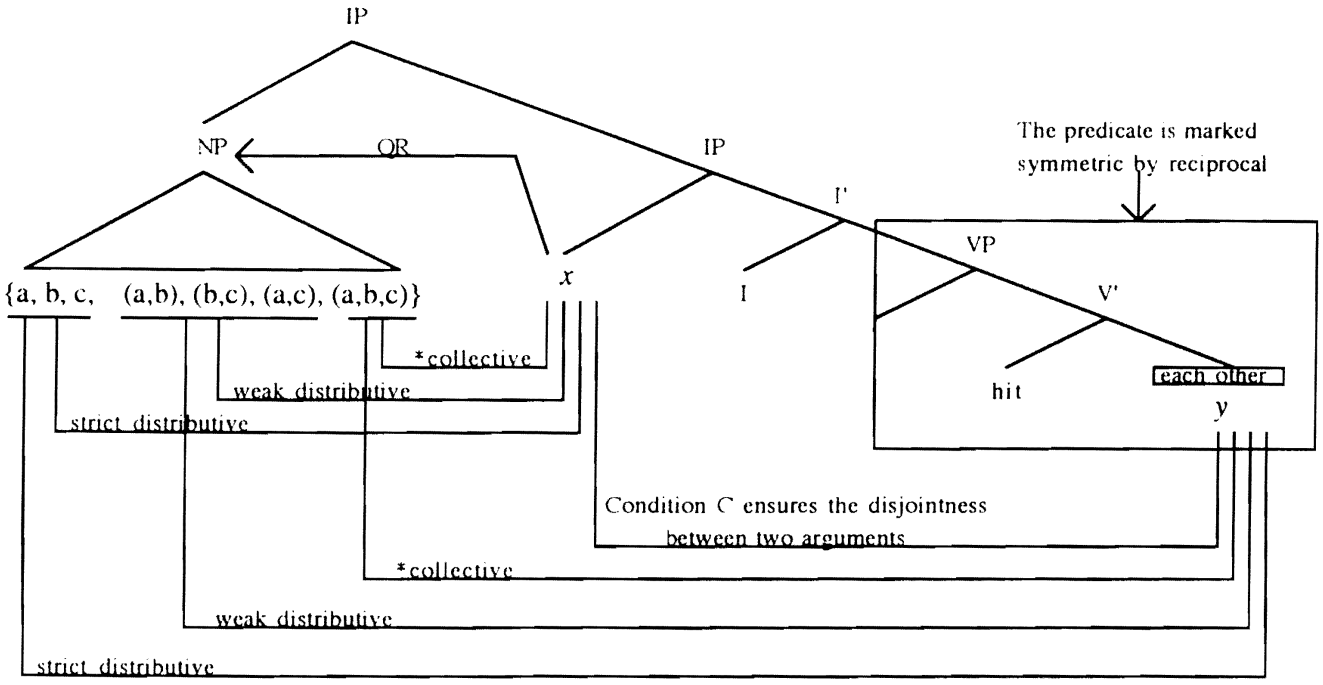
*duifang* or null in Chinese), must be interpreted as a bound variable. Fourth, I will follow Heim (1982) and Diesing (1992) in assuming that there is an obligatory process of existential closure that binds any NPs inside its scope[4]. Thus, reciprocity can be stated as in (15) below:

(15) Logical formulation of reciprocity
$xy\,(x, y\ \mathrm{P})\,xy\,(xRy\ yRx)$

The formulation in (15) is read as "there is an $x$ and there is a $y$, both $x$ and $y$ belong to the same power set P, such that $x$ has a relation with $y$, and $y$ has the same relation with $x$". The multiple lambda abstraction entails a symmetric relation for a reciprocalized predication. To illustrate how these assumptions interact to derive the distributive interpretation for the plural subject in reciprocal sentences, consider the simple example in (16). The LF representation is given in (17) for the case where the plural subject in (16) consists of three individuals.

(16) They hit *each other*.

(17) LF representation for (16)



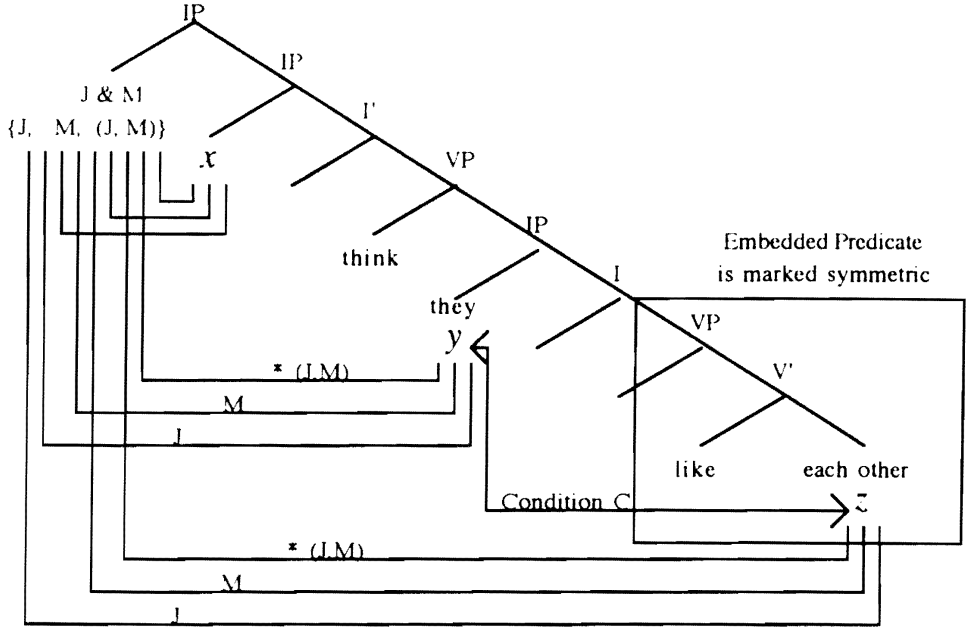

In (17), first, QR raises the subject NP to IP and turns it into a power set. This set contains seven members: three of which are individual elements, and the rest are subset members. This means that all three interpretations (the collective, weak distributive, and strict distributive) are potential values for the variables to pick up. Second, there are two variables in this sentence. The one in subject position (i.e. $x$) is derived by QR, while the one in the object position (i.e. $y$) is originally a reciprocal pronoun which is interpreted as a bound variable. Both variables must be bound by the same antecedent power set, the one created by QR. Third, the two variables must pick up different values at any one time: if $x$ picks up $a$ as its value, $y$ must pick up any value other than $a$. Otherwise, a condition C violation results. Moreover, Condition C will rule out the last subset as a possible value for the variables since no matter which variable picks it as its value, Condition C would be violated. Hence, the collective reading is eliminated, and only the distributive readings (either strict or weak or both) can be obtained.

It is important to note that the analysis presented here provides a set of exhaustive interpretations for a plural NP. This does not seem restrictive enough for certain cases of reciprocal

sentences where reciprocity sometimes involves partition, namely, a plural NP is divided into subgroups and the symmetric relation of a reciprocal predicate holds between subgroups rather than individuals[5]. In our proposal, the partition or subgroup reading is one of the possible interpretations for any plural NP, but not a unique one just for a particular reciprocal sentence. This gives a reflexibility for a plural NP in a reciprocal sentence to be interpreted either as weak (subgroup) distributive or strict distributive. Sentence (16) ("they hit each other"), for example, "describes a general melee, it is compatible with a situation in which there were some nonhitters" (Williams 1991:162). Also, it is compatible with a situation in which everyone is a hitter. Our analysis, thus, provides all possible interpretations, but is not capable of determining an absolute interpretation for each particular reciprocal sentence. Now let us look at the complex example where the so called "scope puzzle" is involved. The sentence in (18) has the LF representation in (19):

(18) John and Mary think they like *each other*.
a. John thinks John likes Mary and Mary thinks Mary likes John.
b. John and Mary think that John likes Mary and Mary likes John.

(19) LF representation of (18)



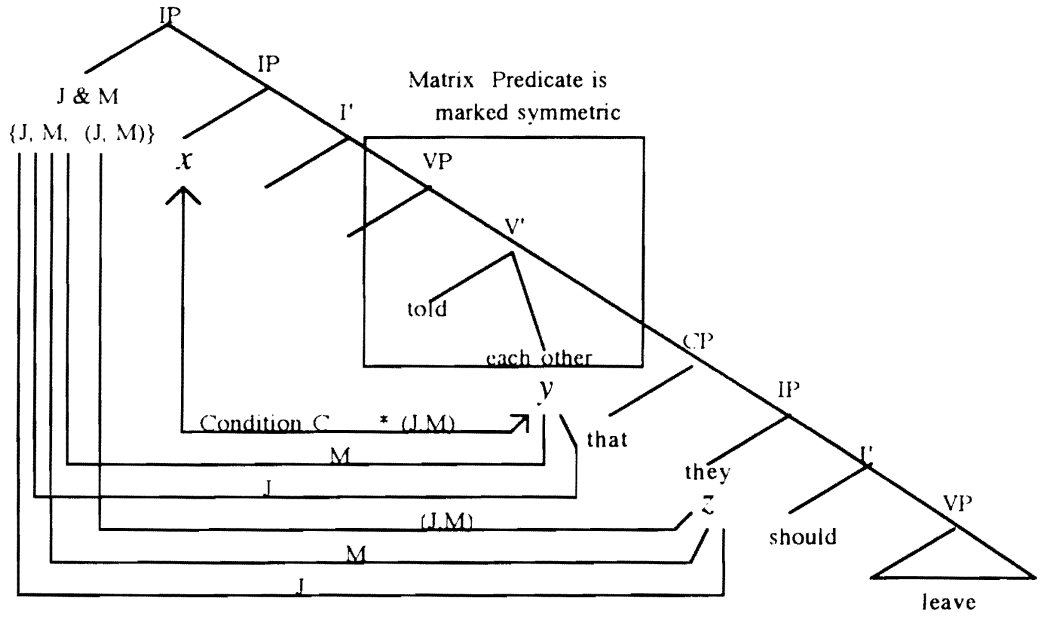

There are three variables in (19). The variable in the matrix subject position (i.e. $x$) can pick up any value from the antecedent power set and, therefore, can be interpreted as either distributive or collective. The embedded subject pronoun and the reciprocal pronoun are both interpreted as bound variables. Since the symmetric relation is only marked on the embedded predicate by the reciprocal pronoun *each other* in the embedded clause, the two variables in the embedded clause cannot pick up the same value from the antecedent set at the same time. In other words, if $y$ picks *John* as its value, $z$ can only pick up *Mary*, or vice versa. Furthermore, Condition C rules out the collective interpretation for both variables in the embedded clause, since it would result in a violation of Condition C. The "scope" ambiguity, which is attributed to the scope of *each*, is now accounted for without scope assignment needed. In our account, the ambiguity in (19) arises from different values the matrix subject variable picks from the antecedent set, and has nothing to do with the reciprocal pronoun *each other*. It is predicted that any sentence with a similar structure without the reciprocal *each other* would have the same ambiguity problem (Williams 1991).

Having demonstrated how the "scope puzzle" can be solved without positing a D(istributor), we now turn to the "grain puzzle". The ambiguity of the "grain puzzle" differs from that of the "scope puzzle" in that the symmetric relation is marked on the matrix predicate rather than marked on the embedded predicate. In particular, the reciprocal pronoun *each other* occurs as the object of the

matrix clause in (20), while it appears as the object of an embedded clause in (18). The sentence in (20) has a LF representation, shown as in (21).

(20) John and Mary told *each other* that they should leave.
a. John told Mary that *he* should leave and Mary told John that *she* should leave.
b. John told Mary and Mary told John that *they both* should leave.

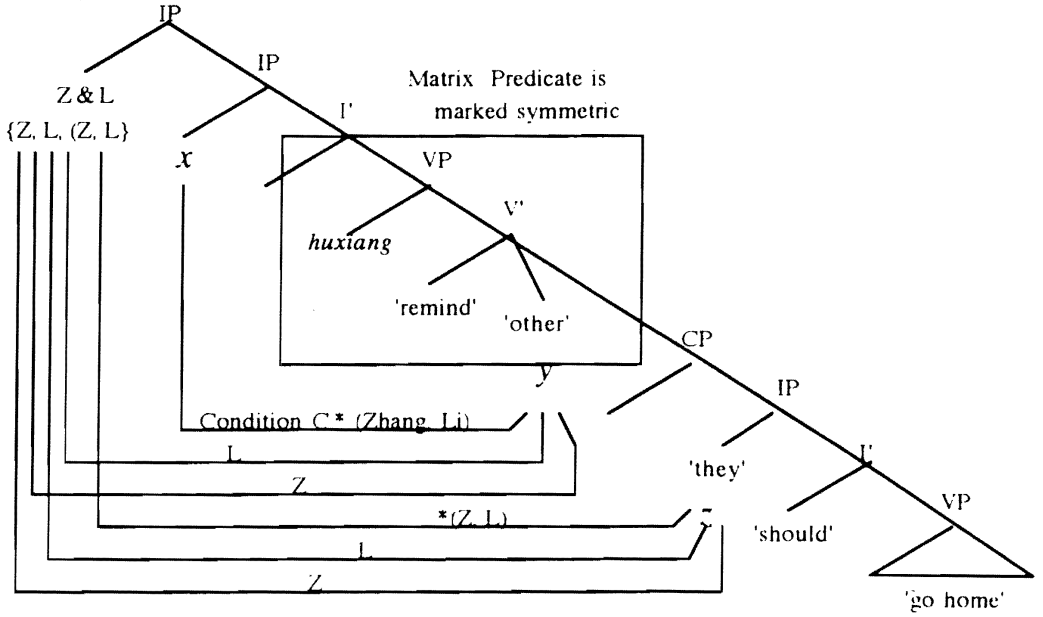
(21) LF representation of (20)




There are three variables in ()21. The two variables $x$ and $y$ in the matrix clause cannot be bound by the subset member in the antecedent set, since symmetric relation is imposed on the matrix predicate and Condition C rules out the collective interpretation for both $x$ and $y$. Also, Condition C prevents both $x$ and $y$ from being bound by the same member from the antecedent set at the same time, since that would violate Condition C as well. The only choice is that $x$ and $y$ pick different members as their values each time. If $x$ picks *John*, $y$ picks *Mary*, or vice versa. Hence, the two variables in the matrix clause can only get the distributive readings. The embedded subject pronoun (which is interpreted as a bound variable here), on the other hand, can freely choose any member in the antecedent set as its value since Condition C is not imposed on the embedded predicate. Hence, the "grain puzzle" is solved without invoking a D(istributor). Notice that our solution for both puzzles reveals William's insight that different variables have different relations with the same antecedent. The difference between our account and Williams' is that we treat distributivity as a LF feature for all plurals, while Williams defines it case by case.

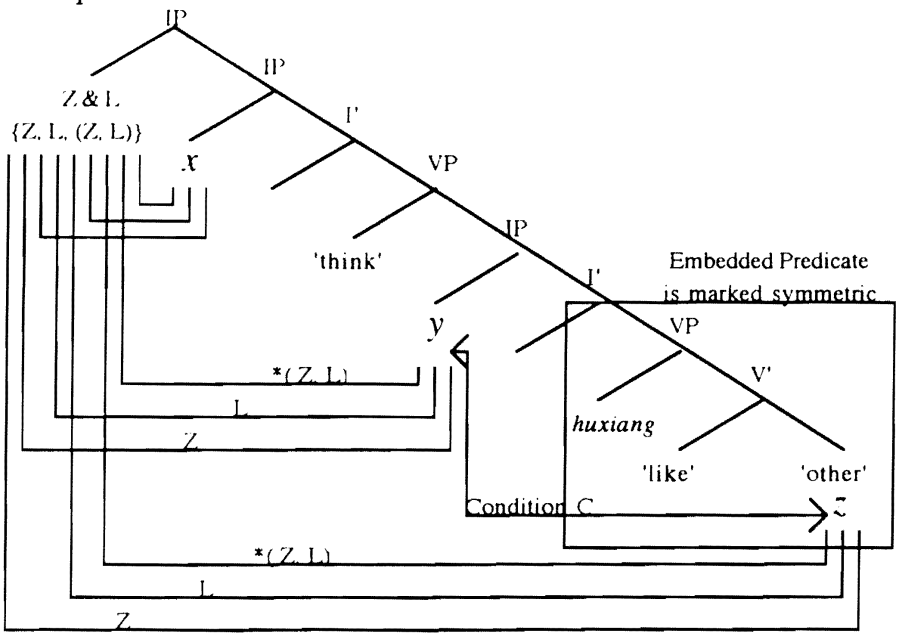
Our analysis has so far worked for reciprocal sentences in English. Now we turn to Chinese cases where the reciprocalized argument may be either a pronoun or null. The sentences (9) and (11) have LF representations in (22) and (23), respectively.

(22) LF representation of (9)




As with its English counterpart, (22) contains three variables: the variable in the matrix subject created by QR ($x$), the null argument or the optional pronoun in the matrix object ($y$), and the pronoun in the embedded subject ($z$). The symmetric relation is marked on the matrix predicate by the reciprocal *huxiang* which appears before the verb. First, Condition C prevents both variables in the matrix clause from picking the subset member as their values, since no matter which variable in the main clause is bound by the subset member, Condition C would be violated. Second, Condition C ensures the disjointness between the two arguments, so that the variable $x$ and $y$ cannot be bound by the same member from the antecedent set at the same time. Thus, the variables in the matrix clause can only have distributed interpretations. The pronoun in the embedded clause, however, can be interpreted either distributively or collectively, since there is no Condition C violation in the embedded clause. The "grain puzzle" in Chinese is solved in the same way as in English.

(23) LF representation of ( )



(23) also contains three variables: the variable in the matrix subject position, and the two variables in the embedded clause. The difference between (22) and (23) is that Condition C applies to the matrix predicate in the former, while it only applies to the embedded clause in the latter. As a result, the variable in the matrix clause can be interpreted as either distributive or collective, while the variables in the embedded clause can only have distributive readings, since the collective interpretation is ruled out by Condition C. Also, Condition C only allows $y$ and $z$ to be bound by different members in the antecedent set each time: if $y$ picks Zhangsan as its value, $z$ must pick Lisi, and vice versa.

## 4.0 CONCLUDING REMARKS

I have shown that reciprocal sentences in Chinese exhibit the same ambiguity puzzles as those found in English. Also, the distributivity in Chinese reciprocals can be derived neither from the intrinsic hypothesis nor from the relational hypothesis. To account for these puzzles in both languages, we treat distributivity as a general feature of plurals derived by QR. By assuming that QR applies to all NPs and that QR creates a power set, we offer 3-way interpretations for a plural NP containing more than two individuals. In assuming that Binding Condition C applies at LF, and that reciprocity involves a symmetric relation marked on a predicate, the collective interpretation that is available for all plurals is excluded for a reciprocalized predicate. The "scope puzzle" comes from the possibilities of the variable in the matrix subject being bound by either the individual members or the subset members, and the "grain puzzle" results from the variable in the embedded subject being bound either by individual members or by the subset members in the antecedent set. The problems of ambiguity that are found in both English and Chinese are thus accounted for without need to postulate a D(istributor) for plurals in general and to treat *each* in *each other* as a quantifier for reciprocal sentences in particular.

## NOTES

* I am greatly indebted to Hamida Demirdache for her teaching, as well as her inspiration on this topic. Not only did the specifics emerge from many conversations with her, but the paper as a whole bears the indelible imprint of her constant input and guidance. I also wish to thank Henry Davis and Rose-Marie Déchaine for their insightful comments. All errors are my own.

1 We do not address pro-drop here, since it is not directly related to our topic. What is relevant here is that a null argument in an object position is allowed in Chinese, and this null argument in a reciprocal sentence is interpreted as a bound variable.

2 I owe this insight to Dr. Demirdache (p.c.).

3 I do not include the null member in the power set for the reason of eliminating vacuous quantification.

4 There is a difference regarding the exact scope of the existential closure between Heim (1982) and Diesing (1992). The scope of the existential closure is the nuclear scope (i.e., the VP) for Diesing, while it is the entire S for Heim.

5 This has been pointed out to me by Dr. Demirdache (p.c.).

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# ESPERANTO INFLECTION AND ITS INTERFACE IN HPSG

**Wei Li**

Department of Linguistics
Simon Fraser University

## 1.0 INTRODUCTION

We give the outline of Esperanto morphology first. Then we show the Esperanto inflection analysis in feature structures. This serves as the basis for our research on the interface between morphological analysis and sentential parsing in the framework of Head-driven Phrase Structure Grammar (Pollard & Sag 1994).

### 1.1. Outline of Esperanto Morphology

An Esperanto notional word consists of two parts: stem and inflection.

word → stem-inflection
stem → (prefix*) - compound - (suffix*)
compound → (root*) - root
inflection → (participle) - class - (number) - (case)

Note: as usual, ( ) for optionality; * for n times repetition (n≥0).

For this paper, we only focus on inflection morphology. Therefore, we assume that the Esperanto lexicon contains stems and inflection morphemes. As a planned language, Esperanto is totally allomorph-free. Due to agglutination, Esperanto inflection is very productive. Based on the 17 inflection morphemes, 106 morphologically legitimate word forms can be produced for each stem: 42 verb forms, 28 noun forms, 28 adjective forms and 8 adverb forms (Li 1994).

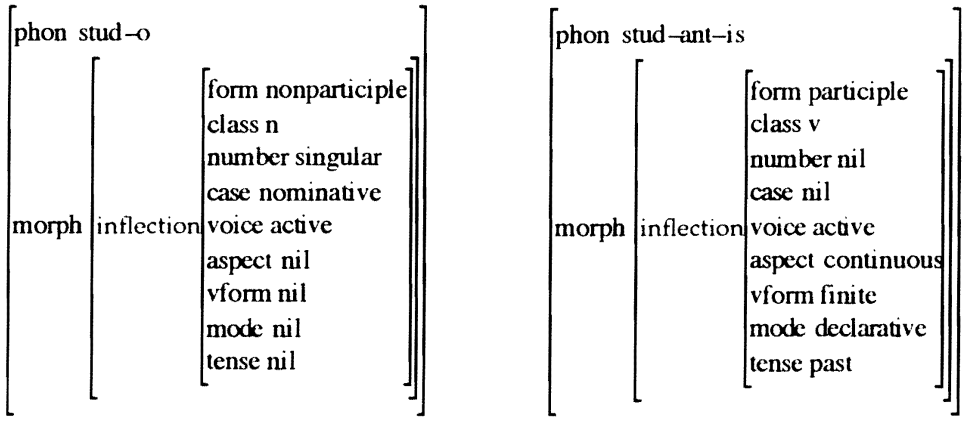
### 1.2 Analysis of Esperanto Inflection Morphology in HPSG

Using morphology MORPH | INFLECTION features, Esperanto inflection can be described as follows (Li 1994).

| | | |
|---|---|---|
| (1) | -o | [class N] |
| (2) | -a | [class A] |
| (3) | -e | [class ADV] |
| (4) | -j | [number PLURAL] |
| (5) | -n | [case ACCUSATIVE] |
| (6) | -i | [vform INFINITIVE] [class V] |
| (7) | -u | [mode IMPERATIVE] [vform FINITE] [class V] |
| (8) | -us | [mode SUBJUNCTIVE] [vform FINITE] [class V] |
| (9) | -as | [tense PRESENT] [vform FINITE] [class V] |
| (10) | -is | [tense PAST] [vform FINITE] [class V] |
| (11) | -os | [tense FUTURE] [vform FINITE] [class V] |
| (12) | -ant- | [aspect CONTINUOUS,voice ACTIVE] [form PARTICIPLE] |
| (13) | -int- | [aspect PERFECT,voice ACTIVE] [form PARTICIPLE] |
| (14) | -ont- | [aspect TOBE,voice ACTIVE] [form PARTICIPLE] |
| (15) | -at- | [aspect CONTINUOUS,voice PASSIVE] [form PARTICIPLE] |
| (16) | -it- | [aspect PERFECT,voice PASSIVE] [form PARTICIPLE] |
| (17) | -ot- | [aspect TOBE,voice PASSIVE] [form PARTICIPLE] |

The implementation of the automatic analysis of Esperanto inflection is not difficult. In 1986, we implemented a procedural analysis algorithm in BASIC (Li 1986). In 1994, we designed an

HPSG morphology parser. Compared with sentential parsing, morphological "parsing" is trivial, but the principles and methodology are similar. With the input of *stud-o* (study: noun) and *stud-ant-is* (was/were studying), for example, the Esperanto inflection morphology parser will output the following results in HPSG feature structures:

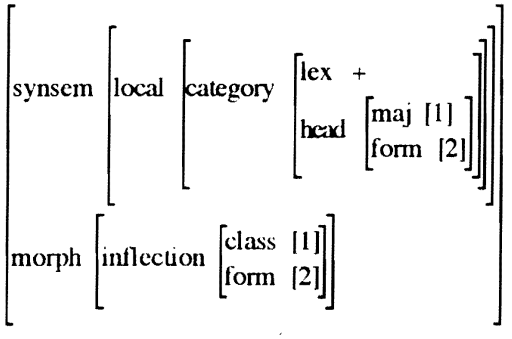



## 2.0 INTERFACE BETWEEN MORPHOLOGICAL ANALYSIS AND SENTENTIAL ANALYSIS

### 2.1 Why Interface?

The output of the morphology analysis will serve as input to the syntax and semantics. But the morphology feature structures defined above are not readily useful for sentential parsing. We need to determine the syntactic/semantic properties of the processed word and build its "synsemic" features. In other words, the system requires a proper interface of information flow.

Some information from inflection morphology gets spread to the syntax for every word. This is the most general information flow in the interface.




But that is far from enough for HPSG sentential parsing. First, the key to the syntactic analysis is the expectation features like syntactic [SUBCAT] for potential head-complement structure and [MOD] for potential head-modifier structure. Second, in addition to syntactic structure, parsing a sentence involves building its semantics based on the semantics of each individual word. All of this information must be supplied before it can be passed to the next phase for parsing.

### 2.2 Derivation and constraints

In light of the philosophy of generative grammar, all of the morphological information given in the lexicon can be seen as an *underlying representation* (UR). From UR, we can derive the *surface representation* (SR) to feed the syntax and semantics. This process is triggered by the result of the morphological analysis. The derivation from UR to SR reflects the information flow in the interface.

HPSG is a non-derivational linguistic theory. The conventional process of derivation will be reformulated as a set of feature constraint rules. Those rules are based on the UR information from the lexicon. (For the convenience of presentation, we will still use the terms *underlying* and *surface*.) Before we define the interface constraint, we need first to design the UR for Esperanto.

2.3 Underlying Structures in the Esperanto Lexicon

The underlying representation in the lexicon consists of two types of information.

(1) For each stem, there is an underlying syntactic category based on the meaning of the stem (Kalocsay & Waringhien 1958). The underlying categories MORPH | MAJ are V for action or change, N for things, and A for quality (of V or N). As we know, a stem of any underlying category may surface as a verb, a noun, an adjective, or an adverb due to the highly regular inflection morphology of Esperanto, e.g.

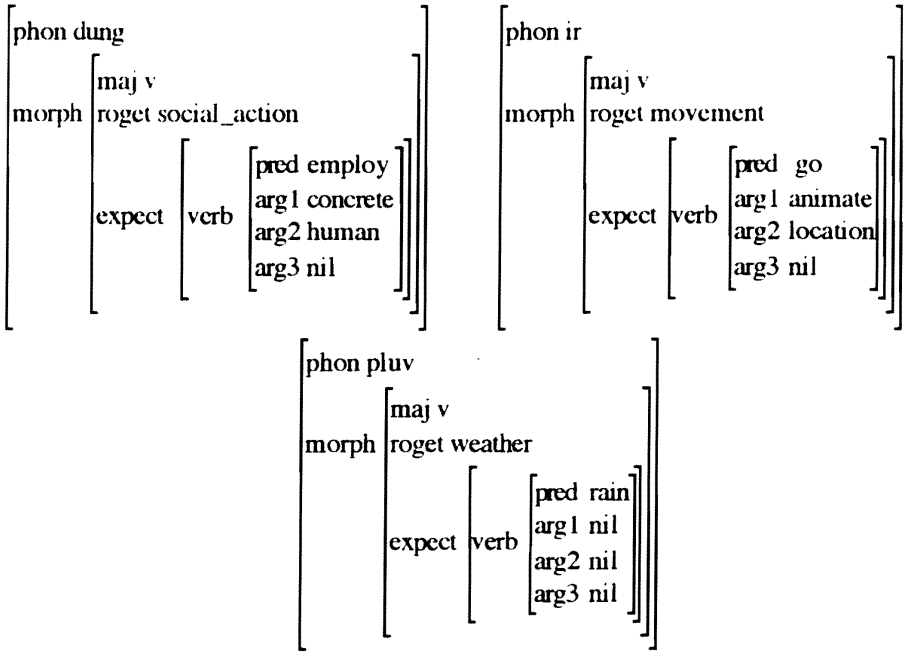
| | | | | | |
|---|---|---|---|---|---|
| N → N: | bicikl-o | (bicycle) | N → V: | bicikl-i | (to bicycle) |
| N → A: | bicikl-a | (of bicycle) | N → Adv: | bicikl-e | (by bicycle) |

(2) The lexicon also contains the underlying semantic expectation features MORPH | EXPECT. The [EXPECT] features are based on the *selectional restriction* of a predicate concept on the semantic classification of its arguments. The semantic classification information is contained in the MORPH | ROGET feature (named after Roget's Thesaurus). The proposal of [EXPECT] and [ROGET] are significant and have various applications in language processing (Li & McFetridge 1995). In fact, it represents some of our common sense knowledge. This type of knowledge serves two purposes for Esperanto analysis. First, the syntactic expectation features [SUBCAT] and [MOD] are based on this semantic [EXPECT]. Second, the selection restriction defined in the [EXPECT] contributes to the building of semantics and the disambiguation work in parsing.

2.4 Sample entries of Esperanto lexicon

All the underlying information is stored in the lexicon. We list below some sample entries for underlying verb, adjective and noun.

(1) Verb



We assume that the maximum valency of arguments for a predicate is 3. The interpretation of arg1, arg2, or arg3 as semantic roles is decided by the predicate. Typically, arg1 is the subject, arg2 direct object, and arg3 indirect object.

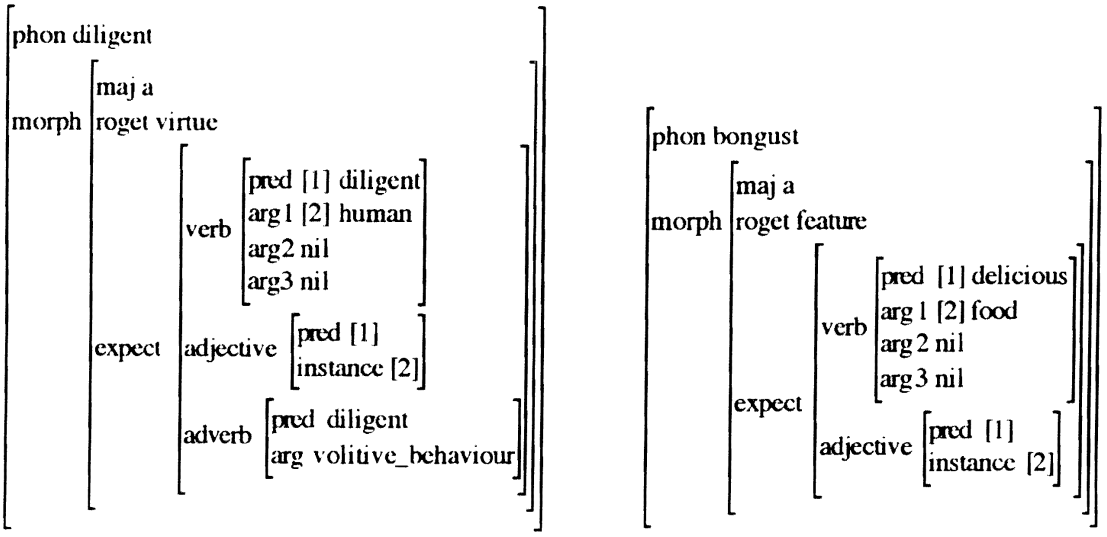
The notion *dung-* (employ) expects a concrete subject argument (arg1: employer) and a human object argument (arg2: employee). This type of information reflects our conceptual world, which is linguistically modeled and lexically encoded as is.

The notion *ir-* (go) is also a predicate taking two arguments, but the second argument is not a usual object but a destination. (At surface level, the role of destination in Esperanto may take different forms, either a prepositional *al*-phrase or an adverb in accusative case.)

The last verb *pluv-* (rain) is a 0-argument predicate. It also surfaces as subject-less sentence, not like English taking a pseudo-subject *it*:

Pluv-is eg-e.
rain-ed great-ly: *It* rained heavily.

(2) Adjective



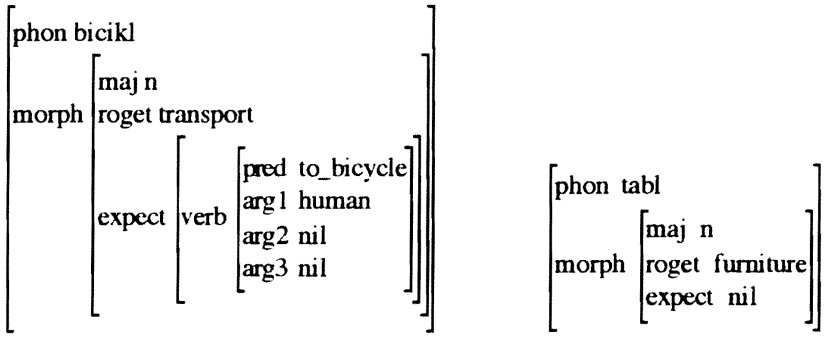

For the underlying adjective, the adjective semantics is equal to the verb semantics (co-indexed by [1] and [2]), as seen clearly in the following pair.

(i) La manghajh-o est-as bongust-a.
the food is delicious.

(ii) La manghajh-o bongust-as.
the food delicious (as a verb)

*bongust-* (delicious) describes and expects food. *diligent-* (diligent) is a notion of human virtue which therefore can modify either a human being (e.g. John, that girl) or a human volitive behavior (e.g. study, work).

(3) Noun




*bicikl-* (bicycle) has a related verb notion requiring a human subject; but *tabl-* (table) can hardly be associated with any conceivable verb notion (at least to most minds). So only *bicikl-* can surface as a verb when the subject is human:

Li bicikl-as rapid-e.
he bicycle-s fast.

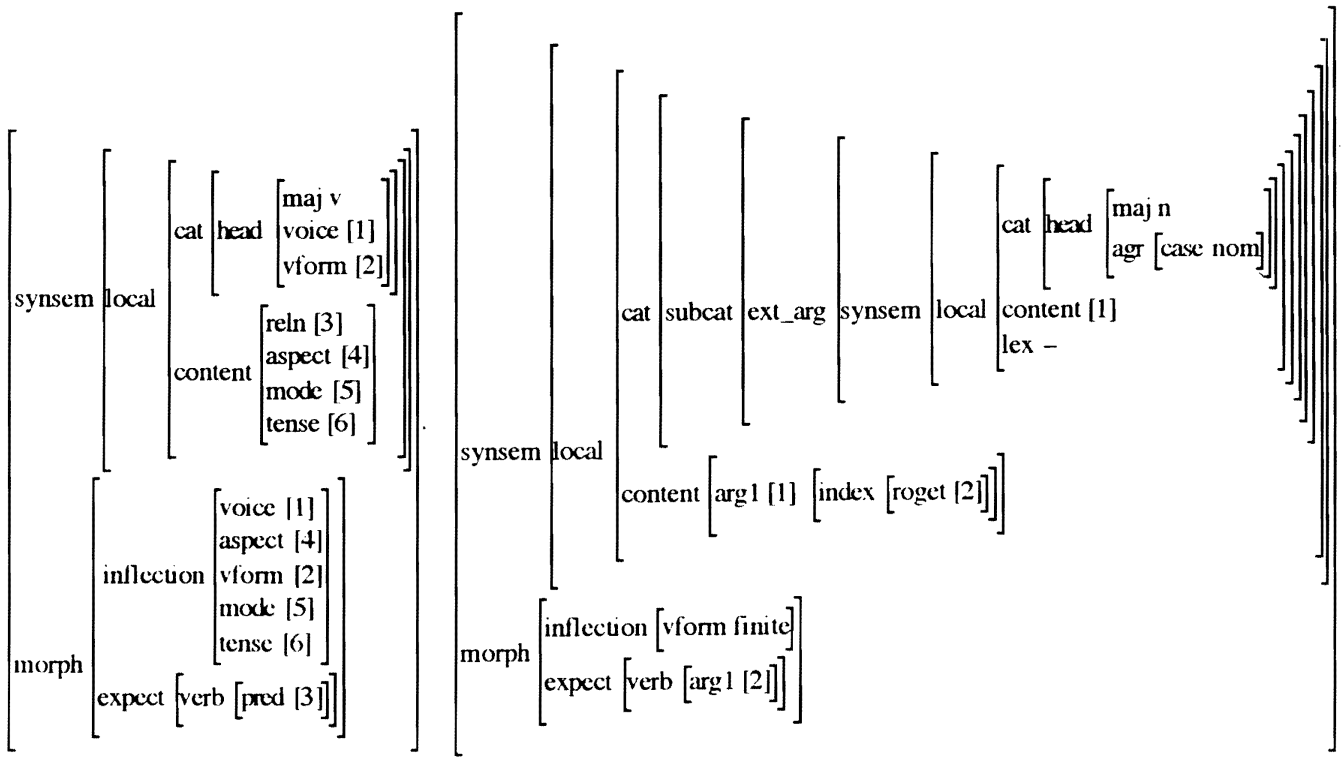
With the exception of nouns, all other categories (V, A, Adv) may have corresponding underlying expectation semantics. This is understandable, for in our present HPSG framework of semantics, noun is the only category not taken as a predicate (semantic head); it is only an argument. Verbs and adjectives expect (and take) nouns. Adverbs expect verbs or adjectives. Nouns expect nothing; they are categories which are expected. Expectation is unidirectional from the head, hence "head-driven".

## 3.0 INTERFACE CONSTRAINT RULES

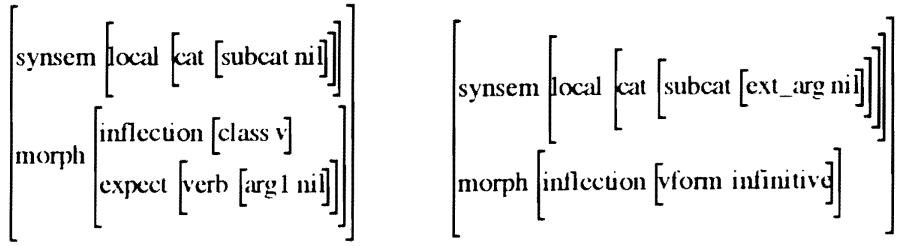
In the following, we only show some basic rules. The complete set of the interface constraint rules for Esperanto is defined in our implementation.

### 3.1 Verb constraint

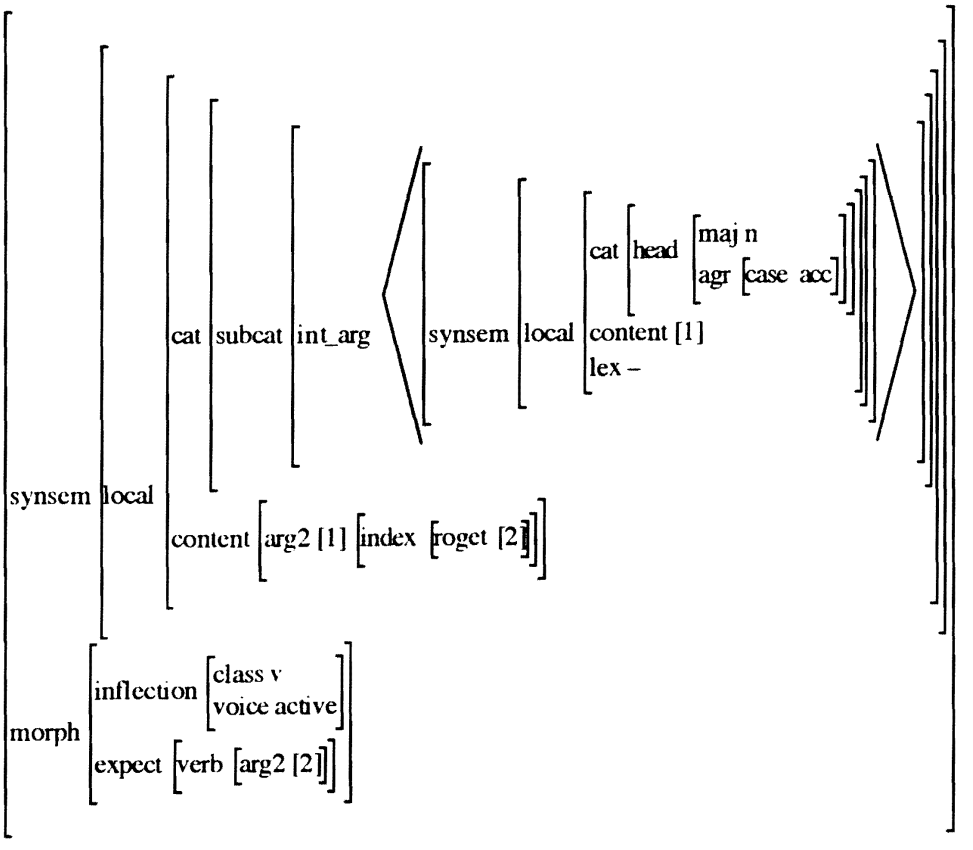
For a verb, the underlying verb semantics surface as the semantics of the word. The verb-related inflection features [VFORM] and [VOICE] are considered as syntactic head features while [TENSE], [MODE] and [ASPECT] contribute to the semantics, so we have the following feature constraint (next page, left structure). A finite verb subcategorizes for a nominative NP as its subject (next page, right structure).




But a 0-argument verb like "pluv-as" (rain-s) has no subject in Esperanto (below left). For an infinitive, the underlying subject is not syntactically required (below right).

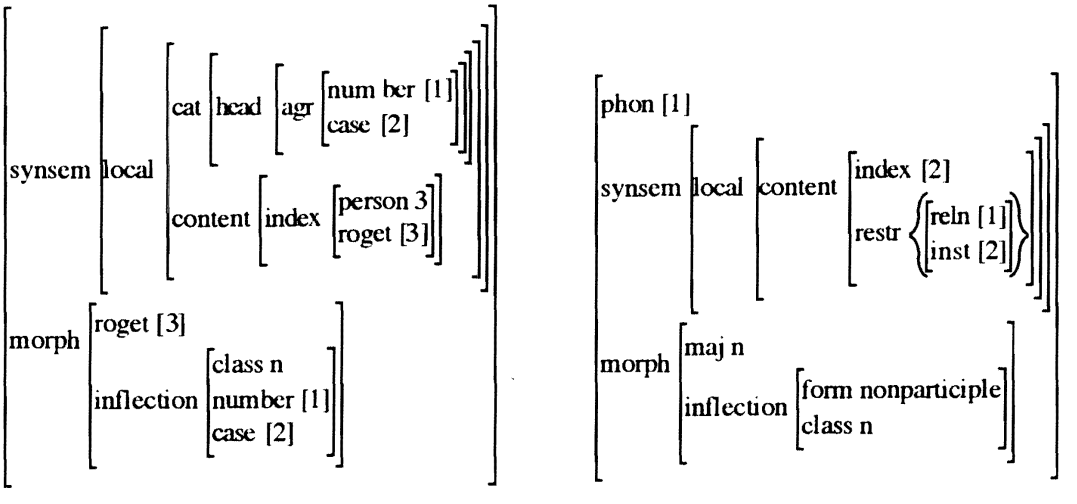



The syntactic property for an active transitive verb would be to subcategorize for an NP in accusative case as its complement (see structure on next page).



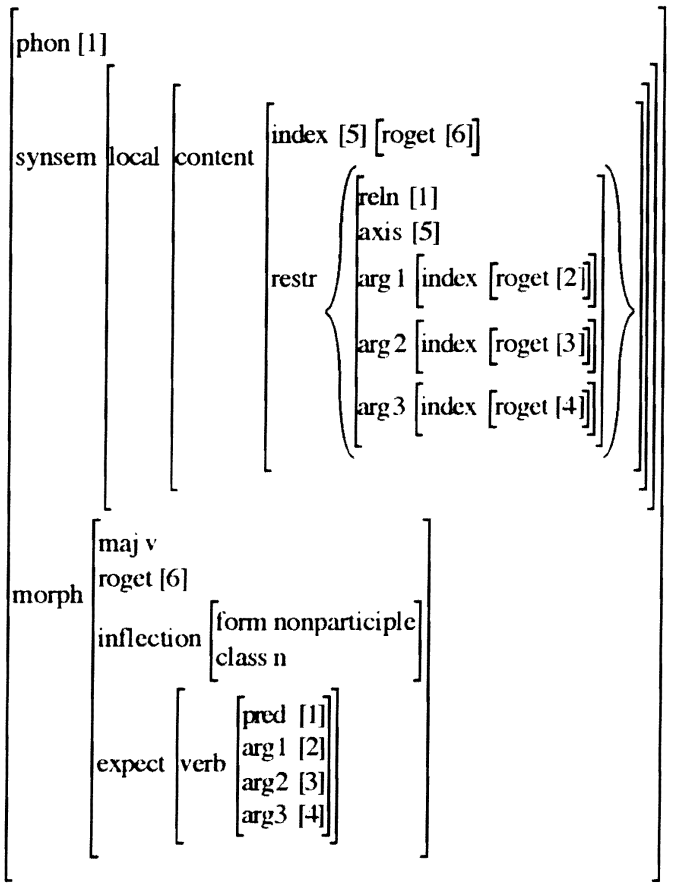

3.2 Noun constraint

The inflectional features [NUMBER] and [CASE] get into the syntactic agreement feature because in Esperanto, the noun agrees with the adjective in number and case. The semantic classification [ROGET] is put into the [INDEX] feature to be used for selectional restrictions (Li & McFetridge 1995) (left). The semantics for a noun standing for the object in the physical world is represented by the index plus its restriction (right).




Things are different for a noun derived from an underlying verb or adjective, for it no longer refers to an object in the world, but stands for an action or quality. As a surface noun, it plays a structural role as other nouns do, but as an underlying verb or adjective, it still retains its verbal (or

adjectival) relation as a predicate with some or all of its arguments often unrealized at surface level. To accommodate this dual function in our semantics, we propose that the restriction in the semantics for the deverbal noun (or de-adjectival noun) equal the underlying verb (or adjective) semantics. The relation between the index and the restriction is represented by a feature [AXIS].

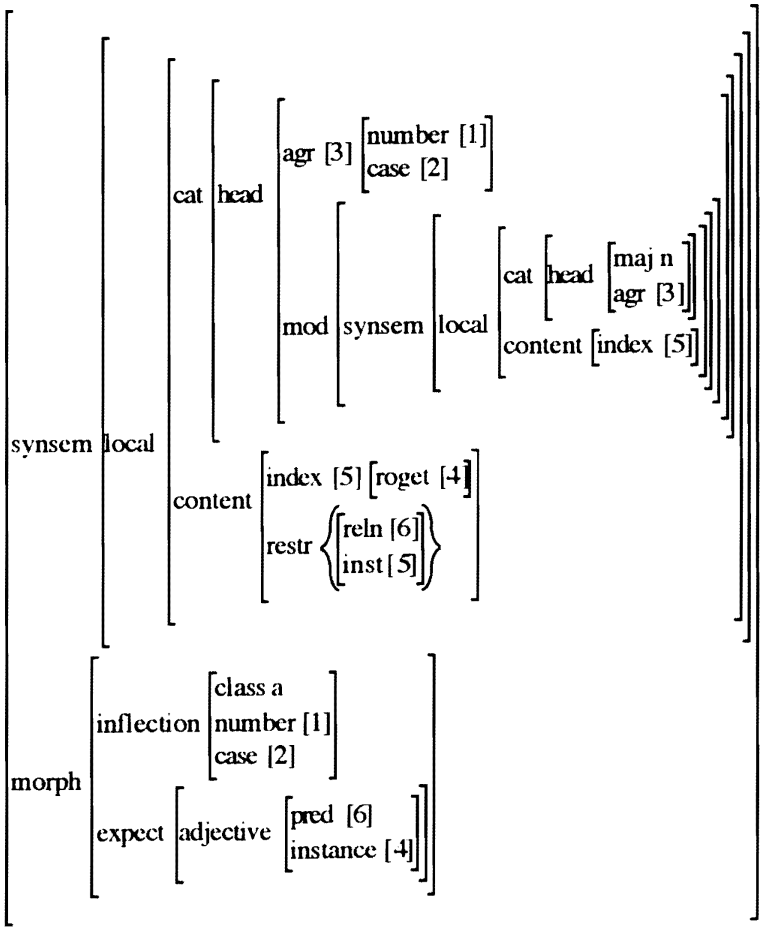



The roles of the arguments for the predicate in the restriction may be left unspecified because these are *optional complements* : they may or may not surface. One approach is to treat them as modifiers, if they appear in regular form. For example, the subject of a deverbal noun may take the form of an adjective and the object may be a non-idiosyncratic prepositional phrase. This approach can only be achieved on two conditions. First, semantically, the head in the lexicon must contain the underlying argument structure, as specified in the feature [EXPECT] in our design of lexicon. Second, syntactically the form of the arguments should not be idiosyncratic, which, fortunately, is largely true for Esperanto as a planned language. (Any idiosyncratic selection, say, requiring a PP with a specific preposition, will have to be treated in the head-complement structure defined in the subcat list of the head noun.) We usually take the modifier approach when the underlying argument is optional on surface. Nevertheless, it is not unimaginable to design an extreme linguistic model of Esperanto in which all arguments are treated as modifiers. There will be no place for head-complement structures in the syntax while the semantics can still be built in the same way. In that case, an accusative noun would select its verb and fill the object role; a nominative noun would select a finite verb as its subject; etc. The feasibility of this measure for Esperanto indicates the regularity of the planned language.

In the above discussion, we differentiate *argument* from *complement*: the former is a semantic term and the latter a syntactic term. More precisely, argument refers to the necessary role expected by the underlying predicate (in [MORPH]) , while complement refers to the obligatory linguistic sign subcategorized for by the head word (in [SYNSEM]). Argument usually, but not necessarily, is realized as a complement.

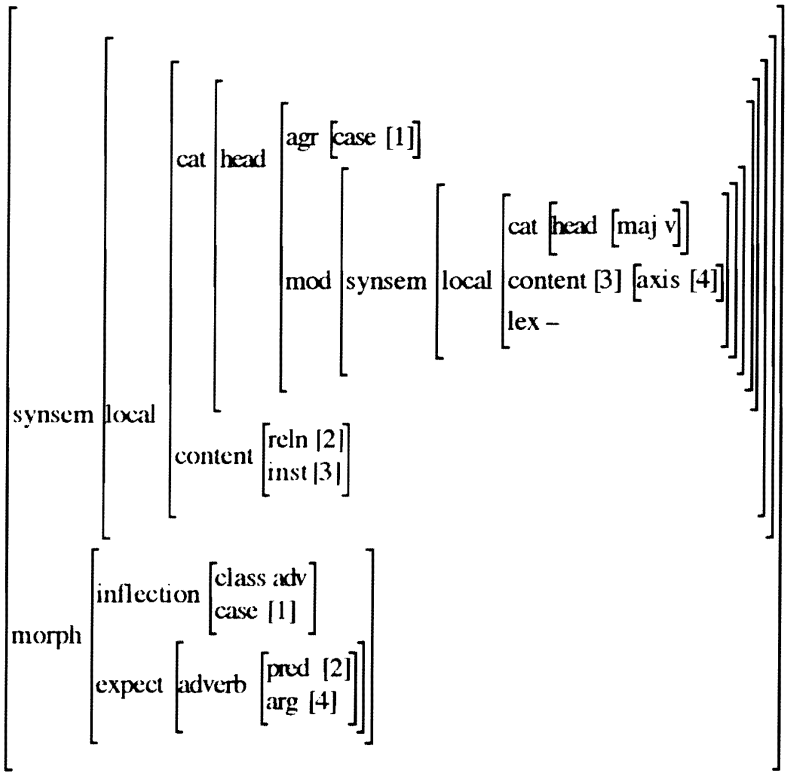
3.3 Adjective constraint

As with the noun, [NUMBER] and [CASE] are agreement features. In addition, there is a syntactic [MOD] feature which corresponds to the underlying adjectival [EXPECT].



3.4 Adverb constraint

Similar to adjective, adverb also has two types of semantics: head semantics for its predicative role and adjunct semantics for its modifier role. But they are token identical.

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# ADJUNCTION AND ANTECEDENT-CONTAINED DELETION

**James Lyle**

Department of Linguistics
University of Washington

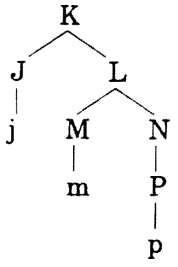
## 1.0 INTRODUCTION

In this paper I would like to address some asymmetries in the behavior of antecedent-contained deletion sentences with respect to arguments and adjuncts. The context for the discussion is a set of recent proposals by Kayne (1994) and Chomsky (1994) which seek to derive phrase structure from more general properties of the computational system. Among the empirical consequences of these proposals which deserve careful scrutiny are the following: (i) adjunction is allowed only on the left, and (ii) the distinction between segments and categories (see May 1985, Chomsky 1986) is lost. Conclusion (i) especially warrants investigation, given the preponderance of phenomena which seem to involve rightward movement (e.g. extraposition) and the fact that in SVO languages adjuncts commonly appear at the right periphery of phrases. Kayne (1994) takes great pains to reanalyze many of these phenomena in light of the conclusions in (i-ii). However, some phenomena do not seem amenable to such reanalysis. Below I will show that certain constructions involving antecedent contained deletions suggests that the conclusions above are insupportable, and hence Kayne's proposal may be too strong.

## 2.0 KAYNE'S (1994) LINEAR CORRESPONDENCE AXIOM

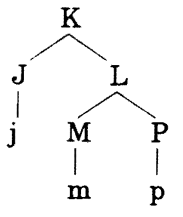
Kayne (1994) proposes to derive X-Bar theory, in effect eliminating phrase structure as a primitive of the theory of grammar, by imposing a strict condition on the linear ordering of terminal elements in a phrase marker, such that linear precedence corresponds to asymmetric c-command. Intuitively, the proposal means that in a given string, constituents which are farther to the right (graphically) must be asymmetrically c-commanded by constituents farther to the left. To see how this works, consider the phrase marker in (1):

(1)




From this phrase marker we can construct a set A of ordered pairs of non-terminal elements such that the first asymmetrically c-commands the second. The set is A={ <J,M>, <J,N>, <J,P>, <M,P>}. Now we can construct a second set d(A), the *image* of A, which is comprised of the set of ordered pairs <x,y> of terminals such that for some pair <X,Y> in A, x is dominated by X and y is dominated by Y. Thus d(A) for the given A here is d(A)={<j, m>, <j, p>, <m, p>}. Note now that if we interpret <x,y> ∈ d(A) to mean that x precedes y, then d(A) completely determines the order of terminals for the phrase marker in (1). Now consider a structure such as (2), where the complex category N has been replaced by a head:

(2)



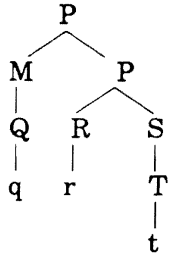
The set A for this structure is A={<J,M>, <J,P>}, and d(A)={<j,m>, <j,p>}. Note that here the linear ordering of the terminals is not completely determined, because since M and P both c-command each other, neither asymmetrically c-commands the other. Thus, no order can be specified between m and p. Kayne's proposal is that structures such as (2), for which the linear ordering of terminals cannot be completely determined, are inadmissible. This is ensured by the Linear Correspondence Axiom:

(3) Linear Correspondence Axiom (LCA):
For any phrase marker T, d(A) is a total ordering of T.

Structures for which condition (3) is not met are not admissible structures. Note that this condition predicts a universal Specifier-Head-Complement order, since specifiers asymmetrically c-command the head and complement of their phrase, and heads asymmetrically c-command their complements (and asymmetric c-command corresponds to linear precedence). This condition also gives us result (i) above, because any right-adjoined element will asymmetrically c-command into the material on its left, in violation of (3).

One immediate problem that arises is that if we take the admissible structure in (1) to be a projection of m (so that L=M' and K=M''), then we have a maximal projection with a non-maximal projection in its specifier, contrary to the usual assumptions of X-bar theory. To deal with this problem, Kayne proposes a slight modification of the definition of c-command such that structures such as (4) will be admissible under the LCA:

(4)




Here we take P to be a projection of r, and M adjoined to P. Under standard definitions of c-command, (4) violates the LCA. The reason is that while M asymmetrically c-commands R and S (giving us <q,r> and <q,t> in d(A)), the lower P also asymmetrically c-commands Q (giving us <r,q> and <t,q>). Since the set d(A) contains the contradictory orderings <q,r> and <r,q> (as well as <q,t> and <t,q>) it cannot constitute a total ordering of the structure.

To deal with this problem, Kayne draws on the distinction between categories and segments (May 1985, Chomsky 1986). In a structure like (4), in which M is adjoined to P, the category P is "split" into two segments, neither of which is a category on its own. Kayne's suggestion is that we let c-command hold only between categories, and not between individual segments of categories:

(5) X c-commands Y iff *X and Y are categories* and X excludes Y, and every category that dominates X dominates Y.

This proposal is in accord with Chomsky's (1994) suggestion that intermediate projections are invisible to the computational system. The lower P in (4) would be an intermediate (single-bar) projection for Chomsky--for Kayne it is a segment, i.e. not a category. Under (5), since the lower P cannot enter into c-command relations by virtue of its status as a segment, the pair <P,Q> is not in the set A for this structure. Now A={<M, R>, <M,S>, <M,T>, <R,T>}, so that d(A)={<q,r>, <q,t>, <r,t>}, a total ordering of (4), in compliance with the LCA. Note, however, that while Kayne's definition of c-command crucially refers to a distinction between segments and categories, that distinction is quite different from the one assumed in May (1985), Chomsky (1986) and later work. The more traditional distinction between segment and category was used to distinguish between phrase-internal positions (specifiers and complements) and adjoined positions. Specifically, specifiers and complements were assumed to be dominated by all segments of the category in which

they are contained (hence *dominated* by the category), while adjuncts were assumed to be dominated only by some segment(s) of the category to which they are adjoined (hence *included* in, but not dominated by, the category). There was thus a distinction in structural terms between specifier and adjoined positions. In Kayne (1994) that distinction has been lost (conclusion (ii) above). For Kayne, specifiers are simply another case of adjunction, so that all non-minimal projections are segments, and there are no intermediate (X') projections.

## 3.0 THE PROBLEM: ANTECEDENT-CONTAINED DELETION

Given these conclusions, let us turn to some apparent examples of rightward-attachment to see whether they can submit to a reanalysis in terms which will bring them into compliance with the LCA. Specifically, I would like to examine instances of antecedent-contained deletion (ACD) which involve constituents to the right of the deletion site. Consider the pair of ACD sentences in (6):

(6) a. John gave a box of girl-scout cookies to everyone he could [e].
b. John gave to everyone he could [e] a box of girl-scout cookies.

The central mystery surrounding such sentences, first noted in Bouton (1970), is this: if we suppose that null VPs such as those given by *e* in (6) are truly empty and receive their interpretation via copying of an antecedent VP at LF, then the null VPs in (6) cannot be interpreted if left *in situ* because they are contained inside their antecedent. Copying of the antecedent VP would yield another instance of the ellipsis, which would in turn need interpretation via copying, leading to an infinite regress: *John gave to everyone he could give to everyone he could give to everyone*. . . etc. To escape this problem, it has usually been assumed that in order for the null VP to receive an interpretation in the above sentences, the clause containing it must get outside of the matrix VP by LF, by means of either Quantifier Raising (QR) (May 1985), extraposition (Baltin 1987), or A-movement to Spec-AgrO (Hornstein 1994, Lasnik 1993). The exact mechanism is not important here, so for the sake of argumentation let us assume that QR is the relevant operation. Note that the two sentences in (6) have the same interpretation, as expected if, in both, the quantified phrase raises to a position outside VP:

(7) [everyone he could [e]]$_k$ [John [$_{VP}$ gave a box of girl-scout cookies to $t_k$]]

From this position it possible to reconstruct the VP *give a box of girl-scout cookies to t* into the empty position within the quantified phrase, giving the intended interpretation:

(8) [everyone he could [give a box of girl-scout cookies to $t_k$]]$_k$ [John [$_{VP}$ gave a box of girl-scout cookies to $t_k$]]

Since the apparent rightward movement in (6b) has no effect on interpretation, we must assume that the phrase *a box of girl-scout cookies* in (6b) is still contained inside the VP even in its right-peripheral position, since it must be available to the reconstruction operation that yields (8) from (7). This accords with Kayne's assumptions, under which the LCA implies that the constituent farthest to the right is also the most deeply embedded. Thus, for Kayne, (6b) is an instance of leftward movement of the phrase *to everyone he could* over *a box of girl-scout cookies*.

The situation in (6) contrasts sharply with the one in (9), with an argument and adjunct instead of two arguments:

(9) a. John saw every movie Mary did [e] twice.
b. John saw twice every movie Mary did [e].

Sentence (9b), with Heavy NP Shift, has the interpretation that both John and Mary saw each movie twice, so the verbal adjunct *twice* must be within the scope of the VP copy operation which gives the null VP its interpretation, i.e. the interpretation is as in (10):

(10) [every movie Mary [saw t twice]] [John [saw t twice]]

In (9a), however, that reading is crucially not available, which means that the adjunct must not be copied into the null VP. Therefore, the target of the reconstruction operation in (9a) must be the string which includes the verb and the trace of the NP complement but excludes the adjunct *twice*, so that the interpretation is as in (11) (with *twice* an adjunct of the matrix verb):

(11) [every movie Mary [ saw t ]]$_k$ [John saw $t_k$ twice]]

I will show that it is not possible to identify that string as the target of reconstruction given the assumptions of Kayne (1994). Instead, it must be the case that the verbal adjunct is right-adjoined.

First, let us examine the syntactic conditions on VP ellipsis reconstruction involving adjuncts more closely. In particular, consider the following two conditions:

(12) Conditions on VP ellipsis reconstruction
I. the target of reconstruction is a constituent.
II. reconstruction is maximal

We might assume that reconstruction simply targets a substring of the terminal string of the antecedent clause, so that targeting the string *saw t* of the larger string *saw t twice* is unproblematic. However, this is ruled out by condition I--VP ellipsis reconstruction targets constituents. We can see that this is the case from two facts. First, discontinuous strings cannot be the target of ellipsis:

(13) *John hit Fred on the head with a crowbar, and Bill did [e] on the shoulder [e]

In (13) the discontinuous string *hit Fred . . .with a crowbar* is the target of reconstruction, and the result is distinctly odd. Second, a continuous string which does not match constituent boundaries cannot be the target:

(14) *John hit Fred on the head and Bill did [e] the shoulder

Both of these facts fall out under the assumption that the operation which reconstructs null VPs does not operate on terminal strings but on phrase markers, i.e. it targets a single node of the tree structure.

Condition II is meant to describe the fact that given a typical VP ellipsis context, the target of the reconstruction of the null VP is maximal, in that the null VP is interpreted as containing as many of the verbal adjuncts of its antecedent as possible. Thus (15a) must have the interpretation in (15b):

(15) a. John hit Fred on the head with a crowbar, and Bill did [e] too
b. John hit Fred on the head with a crowbar, and Bill hit Fred on the head with a crowbar.

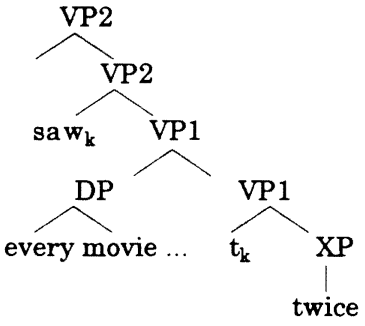
It is possible for adjuncts to be contrasted from the antecedent to the null VP, but the contrasted element(s) must be at the right periphery, and again the reconstruction must be maximal up to the contrast:

(16) a. John hit Fred on the head with a crowbar, and Bill did [e] with a lead pipe.
b. John hit Fred on the head with a crowbar, and Bill did [e] on the shoulder with a lead pipe.

In this respect (9a) is distinctly odd in that even though the adjunct *twice* is not explicitly contrasted between the null VP and its antecedent, that adjunct is nevertheless missing from the reconstruction in (11). We thus hope to accomplish two things: first, we would like to identify the constituent that is targeted in the reconstruction operation that yields (11); and second, we would like to have an explanation for why the reconstruction is not maximal.

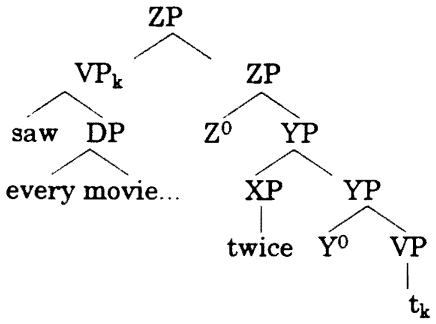
Let us begin by considering the possible structures of the verb phrase *saw every movie Mary did twice* in an LCA-based theory. The adjunct *twice*, appearing as it does on the right periphery, must be the most deeply embedded constituent. Let us assume then a Larsonian shell analysis, so that the structure is as in (17):

(17)




While this structure accords with the LCA, it cannot possibly be the right structure for (9a), because there is no VP constituent here which can serve as the antecedent for the null VP, i.e., a VP which includes the verb and its argument but excludes the adjunct. Suppose then that (9a) results from leftward movement of the VP *saw every movie Mary did* over the adjunct *twice*. If the adjunct is originally projected into the structure to the left of VP, it can only occupy a specifier (=adjunct) position in the LCA theory. And since only one specifier position is allowed per phrase by Kayne (1994), the movement of the VP could only be to a higher specifier/adjunct position, meaning we must assume the presence of an additional functional projection:

(18)




This structure is both consistent with the LCA and contains the constituent we need, namely $VP_k$. The problem here (apart from the questionable nature of the ZP constituent) is that the movement required to get $VP_k$ to the left of the adjunct is wholly unmotivated by independent means, and is thus impossible given the now widely-adopted assumption that movement is driven by the need to satisfy morphological requirements (or to check features; see Chomsky 1993, 1995). If we assume some notion of economy of derivation (Chomsky 1991) then we would like to rule out derivations which contain superfluous steps. There is no property of $VP_k$ which is satisfied by virtue of its moving to the specifier of ZP, hence that movement is unnecessary, and hence in violation of economy of derivation.

In fact there is no representation which we can assign to (9a) which both accords with the LCA and gives us the correct interpretation but does not contain superfluous movement operations. We are thus led to abandon one of our assumptions. I would like to suggest that the LCA in its strongest form should not be maintained, and that adjunction on the right be maintained as an allowable option. Thus the structure of (9a) would be as in more traditional analyses:

(19) John [[saw every movie Mary did [e] $_{VP1}$] twice $_{VP2}$]

Given the structure in (19), the interpretation of the sentence is straightforward. After QR, the reconstruction operation targets VP1, and not VP2:

(20) [every movie Mary [saw t ]]$_k$ [John [[ saw $t_k$ $_{VP1}$] twice $_{VP2}$]]

If this analysis is correct, then a possible solution to the second of our problems above suggests itself. We wanted to explain why the reconstruction is not maximal, i.e. why it excludes the adjunct *twice*, when in typical VP ellipsis contexts all the adjuncts of the antecedent must be included in the reconstruction. The structure (19) for (9a) differs from the more typical VP ellipsis constructions, e.g. (15) and (16), in one crucial respect: in (19), the adjunct c-commands the ellipsis site. I would suggest then that VP ellipsis reconstruction obeys the following condition in addition to those in (12):

(21) III. No constituent which c-commands the null VP can be included in the reconstruction.

The same argumentation holds more generally for other cases of VP ellipsis involving adjuncts. Let us note another asymmetry between arguments and adjuncts in the context of VP ellipsis: adjuncts may be contrasted between the antecedent clause and the ellipsis clause, as shown above, but arguments may not:

(22) a. John hit Fred on the head with a crowbar, and Bill did [e] with a lead pipe.
b. *John gave a box of girl scout cookies to Mary, and Bill did [e] to Fred.

Thus only some of the content of the antecedent VP is reconstructed into the null VP in (22a), namely, the sub-constituent *hit Fred on the head*. Under more traditional assumptions about the position of adjuncts, we would simply say that the reconstruction operation targets VP2 and not VP3 in the antecedent:

(23) . . . [[[ hit Fred $_{VP1}$] on the head $_{VP2}$ ] with a crowbar $_{VP3}$]

In an LCA-based theory, however, (23) is an impossible structure, for the adjuncts on the right asymmetrically c-command the material within VP1, but do not precede that material. However, there is as above no structure we can assign that yields the correct interpretation, conforms to the LCA, and contains no superfluous movements.

The asymmetry between (22a) and (22b) suggest that the mechanism of VP ellipsis treats arguments differently from adjuncts. Given the former segment/category distinction this fact falls out if we assume that VP reconstruction can target any segment of its antecedent category. If arguments are always dominated by all segments of a category, but adjuncts are not, then we naturally conclude that arguments can never be contrasted (as they will always be within the scope of the reconstruction) while adjuncts may be contrasted. This accords with the facts in (22). But if conclusion (ii) from section 1.0, i.e. Kayne's (1994) conclusion that there is no structural distinction between specifiers and adjuncts, is true, then we have no account of why sentences like (22b) are out. The fact that (22b) is ill-formed indicates that the null VP reconstruction operation is sensitive to the distinction between arguments and adjuncts, i.e. between segments and categories as construed by May (1985), Chomsky (1986), etc.

## 4.0 MAINTAINING THE LCA?

If the two empirical conclusions discussed in the introduction are inadequate, then what is the status of the LCA? Kayne's (1994) proposal has two general motivations: (a) to derive linear order of terminal elements from asymmetric c-command relations, and (b) to eliminate the need to postulate a primitive X-bar schema by deriving its effects independently. Part (b) is accomplished strictly by means of the antisymmetry requirement on phrase markers. Part (a), however, requires an independent stipulation: that asymmetric c-command corresponds to linear precedence. Nothing forces such a correspondence however, so it is entirely possible to take the antisymmetry requirement to hold in such a way that it does not in any way determine linear order. Thus the mirror image of the tree in (4), for example, could also be an admissible phrase marker, so long as c-command is divorced from linear precedence. This much was noted by Chomsky (1994, note 32), although Chomsky still takes c-command to correspond to precedence. However, the arguments presented above suggest that it is not possible to assume that right peripheral constituents cannot

c-command items to their left, and if that is the case, then the relationship between c-command and precedence cannot be maintained. This has no bearing on (b), however. Kayne's argument that X-bar theory may be dismissed goes through. We can take the antisymmetry requirement on phrase markers to be a part of UG. However, it seems ordering relations cannot be derived directly from this requirement.

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# WHERE'S THE EMBEDDED AGENT IN FRENCH *FAIRE*-INFINITIVE CONSTRUCTIONS?☆

**Dave McKercher**

Department of Linguistics
University of Victoria

## 1.0 INTRODUCTION

In French, causativity of the sort 'X made/had/got Y (to) do something' may be expressed by the analytic construction composed of the verb *faire* in finite form followed immediately by a second verb in the infinitive form. The two verbs may not be separated by other material in the sentence, such as by an NP. The agent of the "lower" or infinitive verb must follow the *faire* + infinitive verb sequence, though not necessarily immediately. Where the agent appears depends on the transitivity of the embedded verb. Examples (1) to (4) illustrate the range of facts:

(1) Lower verb is intransitive: agent appears in **direct object** position

(a) Jean a fait rire son ami.
Jean made laugh his friend
'Jean had his friend laugh.'

(b) Il a fait partir son ami.
He made leave his friend
'He had his friend leave.'

(2) Lower verb takes a single indirect object: agent appears in **direct object** position

(a) Yves a fait parler Jean à Marie.
Yves made talk Jean to Marie
'Yves made Jean talk to Marie.'

(b) Marie a fait écrire l'enfant à sa mère.
Marie made write the child to his/her mother
'Marie had the child write to his/her mother.'

(3) Lower verb takes a single direct object: agent appears in **indirect object** position

(a) Kim a fait manger le gâteau à son ami.
Kim made eat the cake at/to his friend
'Kim had his friend eat the cake.'

(b) Elle a fait réparer son auto au mécanicien.
She made repair her car at/to the mechanic.
'She had the mechanic repair her car.'

(4) Lower verb is ditransitive: agent appears in **oblique object** position

(a) Louise a fait donner une pomme au professeur par son fils.
Louise made give an apple to the teacher by her son
'Louise had her son give an apple to the teacher.'

(b) Je ferai écrire une lettre au directeur par Jean.
I will make write a letter to the headmaster by Jean
'I shall make Jean write a letter to the headmaster.'

Goodall (1987) accounts for this range of facts by proposing that it is the Case-assigning properties of the causative morpheme *faire* that leads to the embedded agent surfacing where it does. I will briefly outline Goodall's proposal in §2. In this paper, I argue that it is more reliable to predict where the embedded agent will appear from the subcategorization properties of the lower verb. This will entail a discussion in §3 of the *faire...par* construction, a construction which has been analyzed as related to the passive (e.g., by Comrie, 1976). In discussing the *faire...par* construction, I will point out two types of data which need to be included in a complete account of where the embedded agent surfaces. These two types of data are ditransitive verbs (§3.1) and verbs with implicit goal arguments (§3.2). I will suggest that the crucial distinction between the causative *faire* construction and the *faire-par* construction is that the first type of construction gives rise to an agentive reading in which the embedded agent is directly acted upon by the causer—the agent of the matrix verb (i.e., *faire* in finite form). On the other hand, the *faire...par* construction gives rise to an instrumental reading, one in which the embedded agent is less directly involved in the action expressed by the embedded verb. In §4, I provide an account which differs from Goodall's and which extends to a broader range of facts.

## 2.0 GOODALL'S PROPOSAL

Goodall (1987) proposes parallel structures in syntax, or three-dimensional syntactic trees, to handle the facts of coordination. He extends this approach to Romance causatives in saying that causative *faire* subcategorizes for an infinitival clause and for a verb simultaneously (p. 108). With respect to the position of the embedded agent in the *faire* + infinitive construction, Goodall holds that this follows from Case-assignment under the assumption that the verb complex formed from *faire* and the infinitive verb has the Case array [___ACC (DAT)]. This means that the verb complex assigns accusative Case to the first NP following the *faire* + infinitive sequence and dative Case to the next NP, if present. Goodall states that "Accusative Case carries no special morphological marking, but dative Case requires the preposition *à*, through which Case is transmitted from the verb to the NP" (p. 111).

Such an account is consistent with the location of the embedded agent with verbs of the type in (1), (2), and (3). In (1) and (2), the *faire* + infinitive complex takes on the Case array of the causative morpheme *faire*. Accusative Case is assigned to the NP immediately following the verbal complex, this NP bearing the agent theta-role of the lower verb. The indirect object of the lower verb in (2) receives dative Case from the *faire* + infinitive complex, consistent with an optional DAT in the Case array. In (3), the direct object of the lower verb receives accusative Case from *faire* + infinitive and so the optional DAT slot is used to assign Case to the embedded agent NP, thus allowing it to pass the Case Filter.

However, this account does not extend to ditransitive verbs, as in the examples in (4). Here, the agentive NP appears in a *par* phrase (*by* phrase) after the dative NP. Although Goodall excludes examples in which the lower verb in the *faire*-infinitive construction is ditransitive, he discusses the *faire...par* construction (pp. 120-123) as a case in which the subject theta-role (the agent of the lower verb) is deleted by the causative morpheme *faire*. In this way, the agent may optionally appear in a *par* phrase as an instrumental.

## 3.0 THE *faire...par* CONSTRUCTION

The examples in (5) illustrate a type of *faire* + infinitive construction known as the *faire...par* construction. This construction is discussed extensively in Kayne (1975) and more recently in Legendre (1990).

(5) The *faire...par* construction:

(a) Kim a fait manger le gâteau (par son ami).
'Kim had the cake eaten (by her friend).'

(b) Elle a fait réparer son auto (par le mécanicien).
'She had her car repaired (by the mechanic).'

The parentheses around the *par* phrases in (5) indicate that the agent of the lower verb need not be expressed—sentences without these phrases are still grammatical. Kayne (1975:235-237) pointed out a number of similarities between the *faire...par* construction and the passive. For example, idioms which cannot be passivized, cannot appear in the *faire...par* construction and maintain the idiomatic reading. (6a) is one such idiom which can neither be passivized nor embedded in the *faire...par* construction, as shown in (6b). Notice, however, that embedding of the idiom under causative *faire* is fine, as shown in (6c):

(6) Idioms and the passive and *faire...par* constructions (Kayne, 1975:235-237):

(a) Sa famille a cassé la croûte.
'His family had a snack.'

(b) *La croûte a été cassée par sa famille. (passive)
*Il a fait casser la croûte par sa famille. (*faire...par*)

(c) Il a fait casser la croûte à sa famille.
'He had his family have a snack.'

A second similarity is illustrated in (7): possessive pronouns may not find their antecents in a *par*-phrase, whether the *par*-phrase is in a passive construction or in a *faire...par* construction.

(7) Possessive pronouns and the passive and *faire...par* constructions

(a) Jean$_i$ apprendra son$_i$ rôle.
'Jean$_i$ will learn his$_i$ role.'

(b) *Son$_i$ rôle sera appris par Jean$_i$. (passive)
*Tu feras apprendre son$_i$ rôle par Jean$_i$. (*faire...par*)

(c) Tu feras apprendre son$_i$ rôle à Jean$_i$.
'You'll have Jean$_i$ learn his$_i$ role.'

Kayne (1975) ultimately rejects the idea that the *faire...par* construction involves embedding a passivized sentence under *faire*, in part because of the lack of passive morphology. Consider this observation of Comrie's (1976):

> "It seems to me that the availability of the Passive analysis for individual languages will depend on detailed study of those individual languages, in particular of subtle differences between active and passive and possible correlates with the use of the agentive/instrumental phrases in causative constructions" (pp. 272-3).

3.1 Ditransitive Verbs and *faire...par*

A relevant example, in light of Comrie's observation, is given in (8)—a *faire* + infinitive construction in which the embedded verb is ditransitive:

(8) J'ai fait distribuer des prospectus aux maisons par Jean.
I made distribute the flyers to the houses by Jean.
'I had Jean distribute the flyers to the houses.' (agentive reading)
'I had the flyers distributed to the houses by Jean.' (instrumental reading)

Given that there are an agentive reading and an instrumental reading arising from the single sentence in (8), it appears that what we have been calling the *faire* + infinitive construction can be homophonous with the *faire...par* construction, namely in the case of ditransitive verbs. This suggests too that, in French, *par* marks both (i) the embedded agent for ditransitive verbs which have been causativized under *faire* and (ii) demoted subjects in passives, when expressed. Alsina (1992) points out that "unlike what happens in other languages (Romance, Shona, Swahili,

Kinyarwanda, Marathi, etc.), in Chichewa the oblique causee and the demoted subject of passives are marked with different morphology: the oblique causee is marked with the preposition *kwà*, and the demoted subject of passives is introduced by *ndi*" (pp. 537-538). It may well be the case, then, that French simply lacks the luxury of morphological marking which distinguishes the agentive reading from the instrumental reading in examples such as (8).

Recall the data in (7), the relevant parts repeated here in (9), and consider the additional data in (10):

(9) (a) Jean$_i$ apprendra son$_i$ rôle.
'Jean$_i$ will learn his$_i$ role.'

(b) Tu feras apprendre son$_i$ rôle à Jean$_i$.
'You'll have Jean$_i$ learn his$_i$ role.'

(c) *Tu feras apprendre son$_i$ rôle par Jean$_i$.

(10) (a) Elles ont fait peindre sa$_i$ maison à Jean$_i$.
'They had Jean$_i$ paint his$_i$ house.'

(b) *Elles ont fait peindre sa$_i$ maison par Jean$_i$.

Zubizarreta (1985) interprets the data in (9) and (10) as evidence for the adjunct status of the NP appearing in the *par*-phrase: "As in the case of the passive, the *par*-phrase in the *faire-par* construction has the grammatical status of an adverb." (p. 263). That this adverbial has adjunct status follows from the constraint Zubizarreta proposes (p. 256): "If X is an argument of Z and Y is an adjunct of Z, then X cannot be referentially dependent on Y." (I interpret X as *son rôle/sa maison*, Y as *Jean*, and Z as the verb or verb complex).

We have seen that ditransitive verbs which are embedded under causative faire can give rise to two readings—an agentive reading and an instrumental reading. In the case of the agentive reading, the NP appearing in the *par*-phrase should not have adjunct status and reference to it by a possessive pronoun should be possible. The sentence in (11) shows exactly this:

(11) Le professeur$_i$ a fait donner sa$_{i/j}$ feuille de notes à sa mère par l'étudiant$_j$.
'The teacher$_i$ had the student$_j$ give his$_{i/j}$ report card to his mother.'

Though the sentence in isolation is potentially ambiguous, the NP in the *par*-phrase (*l'etudiant*) may be coindexed with the possessive pronoun found earlier in the sentence.

3.2 Verbs with an Implicit Goal Argument and *faire...par*

Further evidence for an agentive (as opposed to instrumental) *par*-phrase in the causative *faire* construction comes from verbs which have an implicit goal argument. An implicit goal argument is one which is semantically present but syntactically optional. In such cases ambiguity arises since the dative NP may be interpreted as either the agent or the goal of the embedded verb. The example in (12) shows this for the verb *chanter* 'sing':

(12) J'ai fait chanter les chansons à l'enfant.
I made sing the songs at/to the child.
'I had the child sing the songs.' (*l'enfant* as agent)
'I had the songs sung to the child.' (*l'enfant* as goal)

In one reading, the verb *chanter* behaves like a single object transitive verb: the agent of the verb appears in indirect object position and receives dative Case. In the second reading, *chanter* is like a ditransitive verb: the dative NP is the goal rather than the agent. To avoid the ambiguity, the sentence in (13) may be used:

(13) J'ai fait chanter les chansons par l'enfant.
'I had the child sing the songs.' (*l'enfant* as agent)

What is crucial in (13) is that the agentive reading is available. The embedded agent appears in oblique object position although the first available *surface* position is indirect object position. The examples in (14), taken from Quicoli (1982:247 Fn. 21), show the same thing with a different embedded verb.

(14) (a) Jean fera porter ce valise à son domestique.
'John will make his servant carry the suitcase.'
'John will have [Unspecified] carry the suitcase to his servant.'

(b) Jean fera porter ce valise par son domestique.
'John will make his servant carry the suitcase.'

I will suggest in the account given in §4 that the goal argument occupies the indirect object position—though it may be syntactically suppressed and is in (13) and (14b)—and that the first available position is in fact the oblique object position. Goodall's account would not be able to predict this since the relation changing is carried out by the matrix verb—the causative morpheme—and not the embedded verb.

## 4.0 IMMEDIATE VERSUS EXTENDED DEMOTION

A complete account of where the embedded agent surfaces in the *faire* + infinitive construction needs to include the ditransitive verbs where the reading is agentive (§3.1) and verbs which have implicit goal arguments (§3.2). The account should also extend to data provided by Goodall (1987:114), and repeated here in (15):

(15) (a) Marie a fait écrire l'enfant.
(b) Marie a fait écrire à l'enfant.
'Mary made the child write.'

Like the verbs which have implicit goal arguments, it seems that *écrire* 'write' in (15b) has an unexpressed theme argument in what would be the direct object position. In (15a), by contrast, *écrire* patterns with the intransitive verbs with respect to where the embedded agent appears. The account needs to allow for this intransitive/transitive alternation possible in the interpretation of certain verbs.

The range of facts may be accounted for in the following model: on combining with causative *faire*, the embedded verb demotes its agent to the first available argument position in its argument structure. This 'immediate' demotion—in the sense of 'to the first available position'—gives rise to the agentive reading, or the reading in which the causer acts directly on the agent of the embedded verb. The schemata in (16) are meant to represent this. The underlined Case labels correspond to the embedded agents in each type.

(16) Immediate demotion, agentive ('direct') reading:

(a) $V_{intr}$ [___ ACC] e.g., Jean a fait rire son ami.
(b) $V_{1tr}$ [___ ACC DAT] e.g., Kim a fait manger le gâteau à son ami.
(c) $V_{2tr}$ [___ ACC DAT OBL] e.g., Je ferai écrire une lettre au directeur par Jean.

In the case of verbs with implicit goal arguments, two schemata are possible, one which contains the syntactically suppressed goal argument and one which does not, as represented in (17) for the verb *chanter* 'sing'. The implicit argument is given in parentheses to indicate that it is syntactically unexpressed. Again, these schemata are for the verb as embedded under causative *faire*.

(17) *chanter* [____ $ACC_{theme}$ $DAT_{agent}$] or [____ $ACC_{theme}$ ($DAT_{goal}$) $OBL_{agent}$]

The data in (15) are accounted for with a similar pair of schemata, given in (18).

(18) *écrire* [_____ $ACC_{agent}$] or [_____ ($ACC_{theme}$) $DAT_{agent}$]

The metaphor of extended demotion can be used for *faire...par* constructions in which the agent is optionally expressed in an instrumental *par*-phrase. For ditransitive verbs in which the embedded agent surfaces, the instrumental reading is the relevant one here. Extended demotion can be represented as in (19).

(19) Extended demotion, instrumental ('indirect') reading:

(a) $V_{1tr}$ [___ACC] (OBL) e.g., Marie fera boire cette eau par son chien.
'Marie will have that water drunk by her dog.'

(b) $V_{2tr}$ [___ACC DAT] (OBL) e.g., Je ferai écrire une lettre au directeur par Jean.
I will have a letter written to the director by Jean.

In the representation, the *par*-phrase is outside the Case array of the verb embedded under the causative to indicate its adjunct status. It is also within parentheses to indicate that it is an optional element. Notice that the representational distinction between (16c) and (19b) captures the distinction in the two readings for ditransitive verbs which are combined with *faire* in the causative construction. Such a distinction, as well as the situation for verbs with implicit arguments, cannot be described if the grammatical relation changing is relegated solely to the causative morpheme, as in Goodall's account. Indeed, reference to the lexical properties of the embedded verb is necessary to accurately predict where the embedded agent appears in French *faire*-infinitive constructions.

## NOTES

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# KANA VS. KANJI PROCESSING IN THE RIGHT VS. LEFT HEMISPHERE

**Tadao Miyamoto and Joseph F. Kess**

Department of Linguistics
University of Victoria

## 1.0 INTRODUCTION

This paper reviews both the psychological literature and the medical literature on kana and kanji processing in Japanese, in an attempt to correct Western misinterpretations about claims regarding lateralization in processing Japanese kana vs. kanji.

## 2.0 CLASSICAL VIEW

Results from the early pioneering studies by experimental psychologists gave rise to the widely-held assumptions that phonologically-encoded kana are processed exclusively in the left linguistic hemisphere, while semantically-encoded, visuospatially-oriented kanji are processed in the right hemisphere. Some tachistoscopic studies of visual half-field recognition for high- and low-familiarity kanji showed left visual field (and thus right hemisphere) superiority for kanji and right visual field (and thus left hemisphere) superiority for kana. As a typical example, we might cite Hatta's (1977a) experimental results which confirmed left visual field superiority for kanji. He further suggested that Japanese orthography might therefore relate differently to cerebral asymmetry of function than the way that Latin scripts do, given that kana typically show right visual field superiority.

Such assumptions were often supported by other findings. For example, Sasanuma et al. (1977) tested normal subjects to ascertain whether there are lateral differences in performance when kana and kanji are tachistoscopically presented in the left and right visual fields. The results show that kana and kanji are processed differently in the cerebral hemispheres; performance on the kana task showed a significant right field superiority, while the kanji task showed a somewhat better performance in the left field.

Such results were also supported by experimental manipulations of the Stroop test. Thus, Hatta (1981) reports that Stroop test color stimuli produced greater interference in the left visual field when subjects were responding to kanji stimuli; such interference was not found for kana stimuli in the same visual field. Hatta interpreted these results as indicating that the right hemisphere is specialized for processing kanji.

This view was also supported by several clinical studies. Sasanuma (1977), for example, discusses two tests on kanji and kana processing administered to 10 Broca's aphasics, 10 simple aphasics, and 10 cerebrally damaged patients showing no aphasia. The most striking result of these tests was that, unlike the patients in the other two groups, those in the Broca's group showed a clear asymmetry in processing kanji and kana; their success rate in kanji processing was roughly around the 50% mark, whereas that of kana processing was almost 0%. Notably, all of their kana mistakes involved distinctive feature effects with proceeding or following phonemes. To

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account for this poor kana performance by Broca's patients, Sasanuma re-iterates a view of cerebral lateralization in which the right hemisphere, dominant for gestalt pattern-matching, is also responsible for kanji processing, and in which the left hemisphere, dominant for sequential, analytical processing, is also responsible for kana processing.

## 3.0 EVIDENCE IN CONTRAST TO THE CLASSICAL VIEW

This classical view of lateralization is, however, not in keeping with more recent psychological and clinical studies. Since the late 1970s, there have been a large number of studies dealing with kanji processing and lateralization, and the results reported by many of these studies do not square with the classical view of lateralization. It is worth reviewing some of the more pertinent of these experimental or clinical studies.

### 3.1 Experimental Studies

Experimental studies of this recent paradigm must be evaluated to examine the effect of two main experimental variables, the experimental stimuli involved and the specific tasks posed. In general, studies which employ tachistoscopic tests involving normal subjects, report that those physical variables in kanji which have visuospatial implications, such as the number of characters, number of strokes, size and rotation angles, and duration of exposure, show no decisive effects on lateralization for kanji processing. In contrast, qualitative variables, such as concreteness, familiarity, and part-of-speech classification, strongly influence lateralization (see Nagae, 1992); for example, abstract and/or unfamiliar kanji which are adjectives or verbs exhibit stronger left hemispheric superiority than concrete and/or familiar kanji which are nouns. Furthermore, many subsequent studies also report that lateralization is not solely influenced by these qualitative variables but also by the depth of processing involved in a specific task.

#### 3.1.1 Physical Stimuli

Most work reports that physical stimuli, such as the number of characters, number of strokes, size and rotation angles, and duration of exposure, have no decisive effects on lateralization. For example, the number of strokes, or figural complexity in the orthography for kana or kanji could be a factor inducing the asymmetry. Bussing et al. (1987) tested 115 German subjects with kana, simple kanji, and complex kanji. The task consisted of indicating, as quickly as possible, whether two stimuli presented in sequence were the same or different. Visual field differences were not found for any of the script types, and the expected left field advantage for higher figural complexity in complex kanji was not found. The results generally suggest that figural complexity has no effect on the identification of kanji and kana.

There is no study which actually examines the effect of letter size on kana and kanji processing (Nagae, 1992). But if Kanda (1984) is correct, the size of characters should not have any effect on the processing of letter, and, hence, on lateralization.

Rotation angles may affect lateralization, and it is generally reported that rotated characters have left visual field advantage. For instance, Hayashi and Hatta (1978) examine laterality differences in levels of cognitive processing by using a mental rotation task in which subjects matched rotated kanji characters with upright kanji. Their finding was that not all mental rotation is pro-

cessed in the right hemisphere, but that when a sizable mental rotation task requires the use of verbal mediators, the left hemisphere contributes more than the right hemisphere to task performance. In other words, although rotation may incur some lateralization effect, such effects do not stem from rotation alone. This conclusion is also supported by Nishikawa and Niina (1981), who failed to find visual field differences due to rotation.

Duration of exposure is not a decisive factor either. Many previous tachistocopic studies employed an exposure duration raging from 50 msec to 200 msec, and suggest that duration of exposure does not have a significant effect on lateralization. One thing to note, however, is that once the duration of exposure exceeds 200 msec, then visual field effect cannot be effectively measured because information has already begun flowing across the corpus callosum. When such defective studies are excluded, one concludes that duration of exposure does not have an effect on lateralization (Nagae, 1992).

### 3.1.2 Qualitative Stimuli

In contrast to such physical stimuli, qualitative stimuli, such as part-of-speech classification, familiarity, and concreteness can have significant effects on lateralization. One experiment by Elman et al. (1981a) on part-of-speech classification has subjects verbally report the grammatical category each word belonged to, while their reaction times to tachistoscopic presentation was taken as the response measure in the second experiment. The results suggest that lateral differences for processing kanji are more complex than previously claimed, with the expected right hemisphere superiority obtained only for nouns, but not for adjectives and verbs. Adjectives and verbs were in fact processed more rapidly in the right visual field, thus suggesting left hemisphere superiority. One reason why part-of-speech classification has such lateralization effect is that nouns tend to denote high imagery objects while adjectival and verbal items fail to provoke such imagery.

Many studies report the significance of familiarity on lateralization (see Kess and Miyamoto, 1994). For instance, Kawakami (1993) examines the effect of script familiarity on lexical decision tasks in an experiment which created familiar/unfamiliar words, three to five kana in length, by writing half of the stimulus words in the kana script they are not usually written in. Subjects judged whether these stimuli, some of which were misspelled, were real words. Reaction times increased in proportion to word length for unfamiliar script words, but this increase was not found with familiar script words. Kawakami's conclusion is that visually familiar sequences of kana are treated as chunks in reading, but that visually unfamiliar sequences are not. In other words, familiar words have more left visual field (and hence right hemisphere) advantage than unfamiliar words due to their visual familiarity.

Concreteness also appears to have an effect. For instance, Ohnishi and Hatta (1980) report that when high concrete kanji are presented to the left visual field and low concrete kanji to the right visual field simultaneously, high concrete kanji are processed better than low concrete kanji, showing that concrete kanji have a left visual field (and hence right hemisphere) advantage. Hatta (1977b) also examined whether there are processing differences for kanji with highly concrete meanings and those with highly abstract meanings. His findings show that concrete kanji are more correctly recognized in the left visual field than abstract kanji, and he therefore argues that, since the right hemisphere facilitates pattern recognition, and since concrete kanji are high in imagery, the factor of concreteness/abstractness affects efficiency of visual information processing and that the process of pattern recognition for verbal stimuli which are processed in the right hem-

isphere is facilitated by imagery. The above finding was also replicated by Elman et al. (1981b) who report that there was a right hemisphere advantage for concrete kanji nouns, but that the left hemisphere was superior in identifying abstract kanji.

In sum, as far as experimental stimuli are concerned, physical stimuli have no significant effect on lateralization, while qualitative stimuli, such as familiarity and concreteness of orthography, have significant effects on lateralization due mainly to their ability to evoke imagery.

3.1.3 Experimental Tasks

Having examined the effects of experimental stimuli on lateralization in the majority of studies, we might also examine the effect of experimental tasks asked of subjects. That is, do the requirements posed by the differing requirements of the various graphemic, phonemic, and semantic tasks employed with subjects have any effects on lateralization of kana and kanji processing?

Experimental studies which employ graphemic processing tasks generally have a pair of letters presented simultaneously to just one visual field for identification, to avoid any involvement of memory. Many previous studies (see Kess and Miyamoto, 1994) show that when there is an advantage, it is usually a left visual field (and hence right hemisphere) advantage. This generalization is hardly surprising, given that the right hemisphere is dominant for gestaltic pattern-matching, and hence responsible for analysis of the configurational aspects of kana and kanji. This generalization works for kana as well, as demonstrated by Kawakami (1993) and Besner and Hildebrandt (1987). Familiar kana words can be treated as visual chunks (i.e., by recourse to a deep orthography) and can be processed without intervention by phonemic decoding procedures. When kana is involved with pure graphemic processing tasks, kana or kana words show this left visual-field (and hence right hemisphere) advantage.

With phonemic tasks, the procedure is usually presentation of stimuli, either in sequence or parallel, to one of the visual fields for identification. Not surprisingly, much previous work (see Kess and Miyamoto, 1994) demonstrates a right visual field advantage not only for kana but for kanji as well. This finding is also not surprising, in that the left hemisphere is dominant in phonemic processing, given that kana (and at times kanji) are endowed with phonemic properties. Hence, if a task involves phonemic processing of kana and kanji, there will be an effect of lateralization by the left hemisphere.

Lastly, semantic tasks usually employ categorical indentification tasks or Stroop tasks. Most experimental studies based on such semantic tasks report a right visual field (and hence left hemisphere) advantage for kana and kanji processing tasks with semantic overtones. For instance, Hayashi et al. (1982) examine the relationship between semantic processing and cerebral laterality effects by measuring response times in a categorial classification task with kanji. The results demonstrate right visual field superiority regardless of response hand for both concrete and abstract kanji, suggesting superiority for the left hemisphere in the semantic processing required for kanji categorization.

Finally, there are also several studies which examine the interactive effects of graphemic, phonemic, and semantic tasks on lateralization. An excellent study which illustrates this point is Sekiguchi et al. (1992), which clearly demonstrates this functional lateralization as determined by the functional requirements of the processing task. This study examines hemispheric differences in kanji processing by employing a sophisticated apparatus for brain-wave measurement. Event-

Related Brain Potentials were measured at several points in the brain, monitoring brain-wave activity in processing graphemic, phonemic, and semantic aspects of kanji compounds. Experimental stimuli were constructed in order to ask subjects whether the same kanji was found in a pair of compounds (graphemic task), whether a given pair of kanji compounds was pronounced the same (phonemic task), and whether a pair of kanji compounds belonged to a specific semantic category (semantic task). The authors then measured brain-waves corresponding to the subjects' activation of a micro-switch in responding to these questions. Brain wave activity was significant in the right hemisphere when graphemic aspects of kanji were being processed; brain wave activity was significant in the left hemisphere when phonemic and semantic aspects of kanji compounds were being processed. The results demonstrate further support for considering the functional effects of lateralization, one which is directly tied to functional requirements of the task before the subject, and not simply to the global fact that it is a task involving kanji processing. The processing requirements of all previous studies should in effect be re-evaluated with this criterion in mind, and simple generalizations about kanji vs. kana processing must be re-interpreted with this fact in mind.

### 3.2 Conclusion

It is clear that we cannot maintain the classical view that kana is processed by the left hemisphere and kanji by the right hemisphere. Our examination of the effect of experimental variables on lateralization clearly shows that, regardless of script type, those which invoke imagery exhibit a right hemisphere advantage. Very simply, familiar kana and kanji words tend to be processed by the right hemisphere. And kana and kanji words denoting concrete objects also tend to exhibit a right hemisphere advantage. Regardless of script type, the configurational aspects of both kana and kanji are predominantly processed by the right hemisphere.

In contrast, the phonemic and semantic aspects of kana and kanji processing are predominantly handled by the left hemisphere. In sum, the cerebral shift to predominance in lateralization is very much affected by the functional requirements of the processing task, rather than by the simple feature of script type.

## 4.0 CLINICAL STUDIES

Clinical studies of patients with unilateral brain damage or split-brain surgery provide even more convincing evidence that a simplistic view of kana and kanji processing cannot be maintained (see Kess and Miyamoto, 1994). Their performance in dichotic listening and tachistoscopic tests suggest that kana and kanji are processed in both left and right hemispheres, and that kana processing is more lateralized than kanji processing. Thus, the left hemisphere is capable of processing the graphemic, phonemic, and semantic information required for kana and kanji interpretation, while the processing ability of the right hemisphere is both limited and different.

### 4.1 Contrasting Views

There is not much doubt that both kana and kanji are essentially processed mainly by the left hemisphere. The issue is, then, assessing the nature and degree of the contribution of the right hemisphere for the processing of kana and kanji. Clinical studies in the vast medical literature offer two opposing views, however. One view advocates that the right hemisphere is divorced from

processing any aspect of kana and kanji. The opposing view admits that the contribution of the right hemisphere is limited, but suggests that it does make a contribution that we cannot deny. Sugishita and his research group are prototypical of those who advocate the first view, while Yamadori and his research group are representative of those who advocate the second view.

### 4.1.1 Sugishita's View

Sugishita (1980) reviews previous studies on split-brain (commissurotomy) patients' abilities to manipulate visual and tactile stimuli, and draws several conclusions regarding cerebral lateralization. One can say that the left hemisphere is specialized for language processing, but there is no other function in which the left hemisphere is superior to the right hemisphere. Secondly, the claim that the right hemisphere is involved in several aspects of language processing (e.g., object-naming, picture-word matching, copying) must be accepted with reservation; studies which drew such conclusions often employed split-brain subjects who had undergone commissurotomy several years prior to the actual tests. Thirdly, the right hemisphere is superior to the left in visuo-spatial processing, given split-brain patients' performance in copying figures such as Necker cubes and tetrahedrons. Lastly, results with split-brain patients confirm that the left hemisphere processes both kanji and kana; while the right hemisphere is involved with certain aspects of kanji and kana processing, such abilities are limited and are only observed a few years after commissurotomy. In sum, Sugishita questions the view that both left and right hemispheres are involved in language processing, and that the difference between the two hemispheres resides in their functional differences.

Thus, patients who have undergone commissurotomy usually exhibit their total inability of processing both kana and kanji immediately after their operations. The right hemisphere begins to regain processing ability only a few years after such operations. What is suggested by these facts is one of three possibilities: the un-transected part of the corpus callosum has started to function to send linguistic information from the left to right hemisphere; or some of the fibers have been restored so that the transmission of the linguistic information has become possible from the left to the right hemisphere; or the right hemisphere has developed some compensatory mechanism which allows the right hemisphere to be able to process kana and kanji. But it is not the case that the right hemisphere is itself inherently capable of processing kana and kanji, at least not according to Sugishita's interpretation of the clinical evidence.

Others are less prone to actively deny that the right hemisphere also has some part in processing kana and kanji. For instance, Iwata (1973) has shown that, in a kanji and picture matching task which requires semantic processing, split brain patients do indeed exhibit 100% performance with their left hemisphere; but they also exhibit a 56% success rate when using the right hemisphere, suggesting that the right hemisphere does have some part in processing kanji. An experiment by Otsuka and Shimada (1988) which employed unilaterally brain-damaged patients shows that left unilaterally brain-damaged patients show more severe damage with kana than kanji, suggesting that kanji processing involves the right hemisphere to some unknown extent.

### 4.1.2 Yamadori's View

The opposing view argues that, although limited, the right hemisphere can and does process some aspects of kana and kanji. The right hemisphere is specialized in processing pattern match-

ing problems, but is unable to sequence linguistic segments. This inability is often seen in the way that split brain patients are impaired in copying tasks. For instance, Yamadori et al. (1983) report a case of disconnection-type agraphia coupled with alexia, caused by lesions destroying the posterior half of the corpus callosum and the left medial occipital lobe. The result was a dissociated agraphia of the disconnection type for kana and kanji, suggesting that the neural substrate of both kana and kanji necessary for writing is stored bilaterally, while the neural substrate for ordering these graphemes into a meaningful sequence is confined to the left hemisphere.

Another instance is cited in Yamadori (1980), which discusses two case studies of right-handed Broca's patients whose symptoms support the above hypothesis. Both patients were able to copy kanji and some kana with their left hands. The author suggests that the right hemisphere is associated with 'motor engrams' for kanji and kana, explaining how patients with symptoms paralleling those of total aphasics can nevertheless copy kanji and kana. Secondly, although these patients could write single kana, they could not sequence kana into words, suggesting that the right hemisphere critically lacks the ability to sequence phoneme-dependent linguistic units.

If Yamadori and his group are correct, we cannot say that the right hemisphere is completely unable to process kana and kanji. What is not known is just how much of the phonological and semantic aspects of processing kana and kanji are participated in by the right hemisphere. So far as we know at this point, the phonemic and semantic processing capabilities of the right hemisphere appear to be minimal when compared to the left hemisphere, but so far no one has clearly demonstrated the extent of its involvement in kana and kanji processing.

## 5.0 CONCLUSION

It is clear that we cannot maintain the simplistic view that the cognitive considerations in processing Japanese orthography are unique, with kana processed by the left hemisphere and kanji processed by the right hemisphere. The issue has more to do with the types of processing tasks involved, and the cognitive requirements they impose. It is, however, safe to assume that, in general, the configurational, or graphemic, aspects of kana and kanji identification and interpretation are handled by the right hemisphere, while the phonemic and semantic aspects of kana and kanji processing are handled by the left hemisphere. Conversely, we neither know clearly if, or the extent to which, the left hemisphere is involved in processing graphemic information, nor the extent to which the right hemisphere is involved in processing phonological and semantic aspects of kana and kanji. Most importantly, we are severely limited in knowing how the left and right hemispheres interact in processing, and this will obviously be the challenge for future studies in psycholinguistics, neuropsychology, and clinical aphasiology.

In sum, the classical view that kanji are processed in the right hemisphere and kana in the left is simply incorrect. A more accurate view reflects the fact that both left and right hemispheres are involved in processing both kanji and kana, but that their participation in processing tasks inevitably reflects different aspects of the task as the human brain responds to varying functional requirements posed by the task at hand.

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# THE SYNTAX OF NEGATION AND OPTIMALITY THEORY

**Mark Newson**

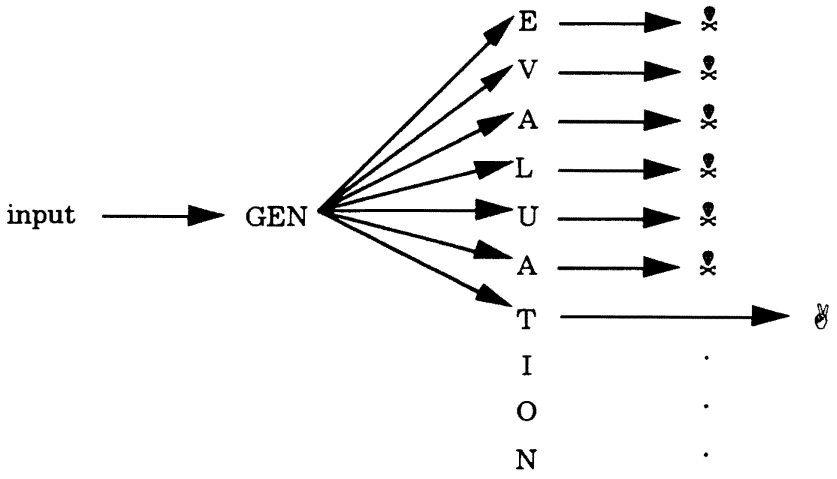
Department of English Linguistics
Eötvös Loránd University, Budapest

## 1.0 INTRODUCTION

Optimality Theory (OT) is a constraint based theory in which constraints are violable and often in conflict: to conform to constraint A, one has to violate constraint B and *vice versa*. Resolving these conflicts is a matter of deciding which constraint to adhere to and which to violate. This provides an elegant way of capturing the cross linguistic differences, as different languages can be seen as adopting different strategies in the face of these conflicts.

The structure of the theory can be given as in (1):

1




We will take the input to be a set of lexical items from which the sentence is to be built. This notion is similar to Chomsky's (1994) 'Numeration'. The only restriction on the input is that it should be possible to form a full sentence from it and hence the selectional properties of the constituent lexical items should all be 'satisfiable' given the input. GEN is an unconstrained set of linguistically relevant processes which acts on the input to form a potentially infinite number of output structures. The kinds of processes that GEN performs on the input are concatenation, insertion, movement, etc. The set of structures produced by GEN is known as the 'candidate set' and this is evaluated to select the most optimal candidate which will then be the grammatical structure associated with the input. The Evaluation consists of a set of ranked constraints. The ranking of constraints is important for deciding which of any conflicting constraints has primacy: higher ranked constraints are less violable than lower ranked ones. It is at this point that linguistic variation is accounted for: different languages have different constraint rankings. In this talk we will use OT to account for various phenomena concerning the syntax of negation, with particular reference to English, Hungarian and West Flemish.

## 2.0 THE CONSTRAINTS

Before looking at individual languages, I will first introduce the set of constraints proposed to account for aspects of the syntax of negation. These are the following:

2 Insert
Do not insert any element or structure

3 Move
Do not move elements in a structure

4 Head
All heads must be overt

5 UniSpec (= Unique Specifier)
Any specifier position may only contain one element (no adjunction)

6 LSM (= License *SM*s)
All *SM*s must be licensed

Most of these are self explanatory, though the last needs a few comments. I assume, adapting ideas from Ouhalla, (1990), Haegeman and Zanuttini (1991), Stowell and Beghelli (1994) and Bródy (1995), that scope relations are marked in certain syntactic positions. In particular, the scope position for a negative element is the specifier of a NgP. Scope can be represented with respect to this position in one of two ways: either the negative element itself moves there, or it employs an empty category in SpecNgP to mark its scope. Such an empty category is known as a Scope Marker (*SM*). So, negative scope is marked thus:

7 a ... $[_{NgP}\ Op_i$ Ng ... $t_i$ ... ] ...
b ... $[_{NgP}\ SM_i$ Ng ... $Op_i$ ... ] ...

If the latter is selected, the *SM* must be licensed, under LSM, by a 'local' negative element, often the negative head. The condition of licensing that I assume is as follows:

8 $\alpha$ licenses $\beta$, $\beta$ a *SM*, iff
i) $\alpha$ is an overt negative element (or its trace)
ii) $\alpha$ and $\beta$ are overtly adjacent
iii) $\beta$ c-commands $\alpha$

9 $\alpha$ is overtly adjacent to $\beta$ iff there is no overt element $\gamma$ such that $\gamma$ intervenes between $\alpha$ and $\beta$ in the linear string.

3.0 ENGLISH

We first establish that English makes use of *SM*s to represent the scope of its negative operators and does not employ operator movement for this purpose. Consider a simple negative sentence such as:

10 John does not like insincerity

Putting aside the issue of do-support, which we will not deal with in this paper, we assume that in (10) *not* is the head of NgP and that there is an empty operator base generated in SpecNgP, following the analysis of Ouhalla (1990):

11 John does $[_{NgP}\ Op$ not like insincerity]

The empty operator is like a *SM* in that it has to be licensed. The negative head serves this purpose, hence the ungrammaticality of (12):

12 * John does $[_{NgP}\ Op$ e like insincerity]

Compare this situation to one which concerns an overt negative operator generated outside SpecNgP:

13 I saw no one

On our assumptions, this sentence contains a NgP with a *SM* for the negative operator *no one* in its specifier position. The question is, 'where in the structure of (13) is the NgP?'. Assuming that the *SM* must be licensed by a negative element, and given that the only negative element in the sentence is the operator itself, we must assume that the operator licenses its own *SM*. Therefore, the NgP that houses the *SM* must be local enough to the operator to allow this. I propose the structure (14):

14 I saw $[_{NgP}$ *SM* e no one]

There are a number of considerations which support (14). For example, an object negative operator obligatorily has narrower scope than the subject, whereas a negative above the VP can have wider scope than the subject:

15 a everyone saw no one
b everyone didn't see an aardvark

The difference in the interpretation of these can be accounted for, assuming the structures in (16) which embrace the VP-internal subject hypothesis, under the assumption of the Scope Principle of Aoun and Li (1993) given in its simplest form in (17):

16 a everyone$_i$ $[_{VP}$ $t_i$ saw $[_{NgP}$ *SM* e no one]]
b everyone$_i$ $[_{NgP}$ *Op* not $[_{VP}$ $t_i$ see an aardvark]]

17 *The Scope Principle* (Aoun and Li, 1993, p.11)
A quantifier A may have scope over a quantifier B iff A c-commands a member of the chain containing B.

In (16a) the negative *SM* does not c-command any part of the chain of the subject quantifier, whereas it does in (16b). Also note that (at least the head of the chain of ) the quantifier c-commands the negative operator in (16b) and hence there are two possible interpretations for this structure.

Under this analysis, when a negative operator licenses its own *SM*, the head of NgP must be empty:

18 * I saw $[_{NgP}$ $SM_i$ not no one$_i$]

Thus, it seems that the negative head is used only as a 'last resort' licenser in English: it is used only when there is no other possible licenser for a negative operator.

A final point before giving the OT analysis of these facts, is that English has Double Negation (DN) structures. When there is more than one negative element in a clause, each of these retains its negative force in the interpretation and hence we get a cancelling out effect. Thus, consider (19):

19 I did not do nothing

I propose the following structure for this sentence, the reasons for which will become clear later:

20 I did $[_{NgP}$ *Op* not do $[_{NgP}$ $SM_i$ e nothing$_i$]]

First note that this structure conforms to the licensing conditions we have been assuming: the empty operator is licensed by the negative head and the overt operator licenses its own *SM*. That this is not a particularly unusual structure for English is indicated by the fact that English seems capable of having a number of NgPs in one clause:

21 he may not have not been reading in the bath

According to basic structural principles, there will be a phrase for every head and hence the multiple appearance of a negative head in a clause means the multiple appearance of NgP in that clause.

In accounting for the above facts in an optimality framework, it is important to note that of the constraints we suggested earlier, Insert conflicts with all others. For example, a language has the choice of either inserting a *SM* for an operator or moving this operator to a scope position. The first option violates Insert and the second violates Move. English ranks Move above Insert: it will be more optimal to violate Insert than Move. Insert also conflicts with LSM and Head, both of which militate for the insertion of a negative head, in violation of Insert. Obviously, English does not have an obligatory negative head and this argues that Insert is ranked above Head. However, the fact that the head is necessary to licence the empty negative operator suggests that LSM outranks Insert. Finally, Insert conflicts with UniSpec in that the latter forces a language to have a unique scope position and hence a unique NgP for every negative operator in the input. This violates Insert as it forces more structure to be inserted: a language which allowed its specifier positions to be multiply filled would only require a single NgP per clause which is more optimal according to Insert. The fact that English has DN structures therefore argues that UniSpec is ranked higher than Insert. The final ranking proposed is therefore:

22 UniSpec, LSM, Move > Insert > Head

In (22) the relative positions of UniSpec, LSM and Move to each other is of no consequence as these do not conflict and ranking is only important for conflicting constraints.

Consider first a simple negative sentence such as (23a) with its proposed structure (23b):

23 a they did not leave
b they [$_{NgP}$ *Op* not leave]

We will assume that negative sentences differ from positive ones in the inclusion of the negative operator in their inputs. Thus, we are assuming that negative heads are inserted into the structure by GEN. The main issue facing this sort of sentence, therefore, is whether or not to insert the negative head:

24

| {they, *Op*, leave} | UniSpec | LSM | Move | Insert | Head |
|---|---|---|---|---|---|
| they [$_{NgP}$ *Op* e leave] | ✓ | *☠ | | | |
| ☞ they [$_{NgP}$ *Op* not leave] | ✓ | ✓ | | | |

Obviously, LSM works to rule out the structure without a negative head as the empty operator will be unlicensed. Thus, although the optimal structure violates Insert, all other competing candidates will violate more highly ranked constraints.

Now consider a case of a negative operator in object position. Recall, in this case, that the NgP is inserted low down in the structure and the head is obligatorily missing. There are at least two issues to decide on: whether to insert a negative head to licence an inserted *SM*, or whether to move the operator to avoid having to insert a *SM* at all.

25

| {he, saw, no one} | UniSpec | LSM | Move | Insert | Head |
|---|---|---|---|---|---|
| ☞ he saw [$_{NgP}$ *SM*$_i$ e no one$_i$] | ✓ | ✓ | ✓ | ** | |
| he saw [$_{NgP}$ *SM*$_i$ not no one$_i$] | ✓ | ✓ | ✓ | ***☠ | |
| he [$_{NgP}$ no one$_i$ e saw t$_i$] | ✓ | ✓ | *☠ | | |
| he saw [$_{NgP}$ no one$_i$ e t$_i$] | ✓ | ✓ | *☠ | | |

Obviously, moving the operator will be non-optimal as Move outranks Insert. The insertion of a negative head is an unnecessary violation of Insert, the inserted *SM* being already licensed by the quantifier.

Finally, we consider a DN structure. These involve inputs with two negative operators as in (26):

26 I [$_{NgP}$ *Op* not say [$_{NgP}$ $SM_i$ e nothing$_i$]] (I did not say nothing)

27

| {I, *Op*, say, nothing} | UniSpec | LSM | Move | Insert | Head |
|---|---|---|---|---|---|
| I [$_{NgP}$ $SM_i$ *Op* not say nothing$_i$] | *☹ | | | | |
| ☞ I [$_{NgP}$ *Op* not say [$_{NgP}$ $SM_i$ e nothing$_i$]] | ✓ | | | | |

Here the critical decision is how many NgPs to insert. As any structure that has fewer NgPs than negative operators will be forced to violate UniSpec, no matter how many violations of Insert it produces, the optimal candidate will be the one that provides a NgP for all negative operators as UniSpec is dominant.

The basic English facts therefore present very few problems for this OT analysis. There remain one or two outstanding issues which for reasons of time we have not discussed, such as the treatment of a negative operator in subject position. These require a little more argumentation, however they can be handled satisfactorily under the assumptions made so far (see Newson 1994 for a fuller treatment).

## 4.0 HUNGARIAN

Like English, Hungarian also makes use of empty negative operators and *SM*s. A simple negative sentence involves an empty negative operator licensed by the negative head *nem*:

28 Gyula [$_{NgP}$ *Op* nem érti]
Gyula not understand-3s-def
"Gyula doesn't understand it"

However, this is where the similarity between the two languages ends. The Hungarian NgP has a fixed position above the VP, following topic and 'subject' positions (see Kiss 1992 on the basic structure of the Hungarian clause). While this means that a VP internal negative operator is never in a position to license its own *SM*, the licensing of *SM*s is not an important issue as the negative head is obligatory in all negative sentences. Hence a *SM* in SpecNgP will always be licensed no matter what its relationship with its operator is. On the other hand, Hungarian also allows negative operators to move to SpecNgP, thus eradicating the need for a *SM*. But even though in these structures the head is not needed to licence a *SM*, it is still obligatory:

29 a [$_{NgP}$ $SM_i$ nem csinál semmit$_i$]
not do-3s nothing-acc
"he doesn't do anything"
b [$_{NgP}$ semmit$_i$ nem csinál t$_i$]
"he doesn't do anything"
c * [$_{NgP}$ semmit$_i$ e csinál t$_i$]

A final difference between Hungarian and English is that Hungarian allows only Negative Concord (NC) structures. This means that multiple negative elements are used in sentences to express a single negation. This can be seen in sentences such as (30):

30 senki nem látott semmit
no one not saw nothing-acc
"no one saw anything"

Following Haegeman and Zanuttini (1991), we assume that NC arises in situations where multiple negative elements are associated with a single SpecNgP. When more than one negative element or their *SM*s are in or adjoined to SpecNgP there is a 'factorisation' of their negative features and the result is the expression of a single negation. This is very similar to the idea proposed by Higginbotham and May (1981) that in multiple wh-questions there is an absorption of the [+wh] features and such sentences express a single question. Of course, the contrast is with DN structures, which we have described as structures containing more than one NgP. Obviously, when negative elements are associated with different SpecNgPs, there can be no factorisation of their negative features and a DN reading is the result.

The fact that the Hungarian negative head is obligatory in negative sentences indicates that Hungarian ranks Head above Insert. This leads to the fact that LSM will always be adhered to, and hence has very little work to do. For this reason we can place this constraint low in the ranking. That Hungarian has NC instead of DN structures argues that Insert outranks UniSpec: it is more optimal to associate multiple negative operators with a single SpecNgP than it is to insert the extra structure needed to provide each with its own scope position.

It may at first seem problematic that Hungarian allows both operator movement and the insertion of *SM*s optionally: we have dealt with these phenomena in terms of two conflicting constraints (Insert and Move) - how can a language conform to both? The answer I propose is straightforward: conflicting constraints are not always ranked with respect to each other. When such constraints are not ranked, both occupy the same position in the ranking. As these constraints conflict, every relevant structure will violate one or the other and hence every structure represents a violation of one constraint at this rank position. When this happens no candidate is eliminated and all survive to be further evaluated.

The ranking I propose for Hungarian is (31), where equal ranking of conflicting constraints is shown by braces and the ranking of non-conflicting constraints is unimportant:

31 Head > {Insert, Move} > UniSpec, LSM

As we have only so far considered DN structures, I will demonstrate here how placing Insert higher than UniSpec in the ranking leads to NC structures. Consider the sentence:

32 $[_{NgP}$ senki$_j$ $SM_i$ nem csinál semmit$_i$ t$_j$]
no one not does nothing-acc
"no one does anything"

Here there is a single NgP, the specifier of which contains the *SM* for a negative operator in the VP and an operator moved to adjoin to it. In this configuration, the negative features of the moved operator and the *SM* are "factored out", hence only one negation is expressed. The movement is optional and has no bearing on the NC issue, hence we will not discuss it here - we return to the issue below. The question is why is there only one NgP? The table in (33) compares this structure to one in which each operator is associated with a unique SpecNgP:

33

| {senki, semmit, csinál} | Head | {Insert | Move} | UniSpec | LSM |
|---|---|---|---|---|---|
| ☞ $[_{NgP}$ senki$_j$ $SM_i$ nem csinál semmit$_i$ t$_j$] | ✓ | {*** | *} | | |
| $[_{NgP}$ senki$_j$ nem $[_{NgP}$ $SM_i$ nem csinál semmit$_i$ t$_j$]] | ✓ | {***** | *}☠ | | |

As the table shows, the optimality of the single NgP is decided on the Insert constraint: inserting an extra NgP will always constitute more violations of Insert than structures with only one NgP. Even if the insertion of the head were not necessary, or if the *SM* were not inserted but the second operator were to be moved, the structure with two NgPs involves inserting one more NgP than one

Obviously, moving the operator will be non-optimal as Move outranks Insert. The insertion of a negative head is an unnecessary violation of Insert, the inserted *SM* being already licensed by the quantifier.

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| $[_{NgP}$ senki$_j$ nem $[_{NgP}$ $SM_i$ nem csinál semmit$_i$ t$_j$]] | ✓ | {***** | *}*! | | |

As the table shows, the optimality of the single NgP is decided on the Insert constraint: inserting an extra NgP will always constitute more violations of Insert than structures with only one NgP. Even if the insertion of the head were not necessary, or if the *SM* were not inserted but the second operator were to be moved, the structure with two NgPs involves inserting one more NgP than one

with only one. Hence having Insert above UniSpec in the ranking will force the language to stack multiple operators or their *SM*s in a single SpecNgP and hence force a NC reading.

Finally, we turn to the optionality of inserting *SM*s or moving negative operators to provide them with their scope interpretations. This follows from the fact that Insert and Move are not ranked with respect to each other. We take a simple example:

34 a $[_{NgP}$ semmit$_i$ nem látok t$_i$]
nothing-acc not see-1s
"I don't see anything"
b $[_{NgP}$ *SM*$_i$ nem látok semmit$_i$]
"I don't see anything"

As both of these structures are grammatical, they should be equally optimal. That no other structure is more optimal than those in (34) follows from what we have discussed above: there must be a single NgP with an overt head otherwise some high ranking constraint will be violated. That both of these structures violate the constraits equally is shown in the following table:

35

| {látok, semmit} | Head | {Insert | Move} | UniSpec | LSM |
|---|---|---|---|---|---|
| ☞ $[_{NgP}$ semmit$_i$ nem látok t$_i$] | ✓ | {** | *} | ✓ | ✓ |
| ☞ $[_{NgP}$ *SM*$_i$ nem látok semmit$_i$] | ✓ | {*** | ✓} | ✓ | ✓ |

The first structure violates Insert only twice (insertion of the NgP and insertion of the head), whereas the second violates this constraint three times. However, the first violates Move once and the second does not violate it at all. Thus both structures violate constraints at this rank position three times each and therefore are equally optimal. It is easy to see that this result carries over to more complex examples, with more negative operators. The difference between the structures will be whether a *SM* is inserted or the operator is moved. If we choose to satisfy one constraint, we violate the other and *vice versa*. The structure with the fewer Insert violations will be the one with the most Move violations, and structures with fewer Move violations will have exactly the same number more Insert violations. Thus, no matter how many operators there are, moving them will always be as optimal as inserting *SM*s for them and, therefore, operator movement is an optional syntactic process.

## 5.0 WEST FLEMISH

The final language we will consider is West Flemish. All data are taken from Haegeman and Zanuttini (1991) and Haegeman (1992). West Flemish (WF) differs from English and Hungarian in that it has no empty negative operators or *SM*s. The operator used in simple negative sentences is overt, and other negative operators always move to SpecNgP, thus there is no insertion of *SM*s:

36 a da ze nie ketent van eur werk (en-)was
that she *Op* contented with her work ng-was
"that she was not pleased with her work"
b da ze me niks ketent (en-)was
that she with nothing contented ng-was
"that she was not pleased with anything"
c * da ze ketent me niks (en-)was

(WF is a V2 language and to avoid complicating issues concerning word order we will only consider subordinate clauses.) Haegeman and Zanuttini (1991) argue that the NgP in WF sits above the VP but below the inflectional nodes. The verb moves out of VP, passing through the NgP head and picking it up as it does so, and ends up in AGR (in subordinate clauses). The overt operator *nie* stays in SpecNgP. Thus, in (36a), it is the operator which indicates the position of the NgP, not the negative head. A more detailed analysis is given in (37):

37 da ze $[_{NgP}$ nie t$_i$ $[_{VP}$ t$_i$ ketent van eur werk]] en-was$_i$

Note that the position of the PP complement of the adjective *ketent* is normally following it. (36b and c) demonstrate the situation with a negative operator generated outside NgP: these must move to SpecNgP to be properly interpreted. The ungrammaticality of (36c) indicates that the insertion of *SM*s, leaving the negative operator *in situ*, is prohibited. This leads us to the conclusion that Insert must be more highly ranked than Move.

Because there are never any empty negative operators to licence, LSM does no work in WF. Moreover, the negative head is never required for licensing purposes. Thus, the appearance of the negative head in negative sentences must be entirely due to Head. However, in all relevant cases the negative head is optional in WF, indicating that Head and Insert are equally ranked.

An interesting fact about WF is that it has both DN and NC structures. However, both are associated with different surface orders. This provides us with further support for our analysis of the difference between DN and NC structures. Consider the following data:

38 a da ze $[_{NgP}$ me niemand$_j$ nie $t_i$ $[_{VP}$ $t_i$ ketent $t_j]]$ (en-)was$_i$
that she with no one *Op* pleased ng-was
"that she wasn't pleased with anyone"
b da ze nie me niemand ketent (en-)was
that she *OP* with no one pleased ng-was
"that she wasn't pleased with no one"

(38a) demonstrates that a NC structure is achieved by moving the negative operator to the left of *nie* generated in SpecNgP, presumably adjoining to it. We have claimed that this is the configuration under which the negative features of the operators will be factored out and a NC reading results. This is confirmed by this datum. It is at first puzzling why, when the operator is moved to the right of SpecNgP, a DN reading should result. Note that the negative PP complement does move from its base generated position to the right of the adjective, in line with our claims that WF is unable to insert *SM*s. But this argues that the operator moves to some SpecNgP in order to receive its scope interpretation. If this movement were to right adjoin the PP to *nie* we would have no account of why there should be a DN reading: there is no reason to believe that the process of negative factorisation should be affected by which side an element is adjoined to another. Furthermore, Haegeman and Zanuttini (1990) point out that when the PP moves to the right of *nie* it has narrower scope than when it moves to the left. Again, if both movements are to the same position then we have no account for this difference, under the assumption that scope is determined under c-command. However, if we assume the structure in (39), then all these puzzles are satisfactorily answered:

39 da ze $[_{NgP}$ nie $t_i$ $[_{NgP}$ me niemand$_j$ $t_i$ $[_{VP}$ $t_i$ ketent $t_j]]$ (en-)was$_i$

Assuming a second lower NgP providing a unique scope position for the negative PP accounts for both the scope interpretation and the DN reading: the PP, having a lower scope position, will naturally have a narrower scope and as it is not associated with the same SpecNgP as the negative operator, the factorisation of their negative features cannot take place. This adds strong support for our analysis of DN as involving more than one NgP.

The fact that WF allows both DN and NC structures leads to the assumption that UniSpec and Insert are not ranked with respect to each other and thus, the final ranking I will propose for WF is as in (40):

40 {Insert, UniSpec, Head} > Move, LSM

For reasons of space, here we present only an example of how the non-ranking of Insert and UniSpec produce optional DN and NC structures for the same inputs. Consider again the structures (38a) and (39), given here as (41a) and (b) respectively:

41 a da ze [$_{NgP}$ me niemand$_j$ nie $t_i$ [$_{VP}$ $t_i$ ketent $t_j$]] (en-)was$_i$
b da ze [$_{NgP}$ nie $t_i$ [$_{NgP}$ me niemand$_j$ $t_i$ [$_{VP}$ $t_i$ ketent $t_j$]] (en-)was$_i$

The crucial issue is how many NgPs to insert into the structure: one or two (any more will give rise to unnecessary Insert violations and any fewer will not provide the structure with an interpretation). That these options are equally optimal is shown in table (42):

42

| {... ze, nie, was, ketent, me, niemand} | {Insert | UniSpec | Head} | Move | LSM |
|---|---|---|---|---|---|
| ☞ da ze [$_{NgP}$ me niemand$_j$ nie $t_i$ [$_{VP}$ $t_i$ ketent $t_j$]] (en-)was$_i$ | {* | * | -} | * | ✓ |
| ☞ da ze [$_{NgP}$ nie $t_i$ [$_{NgP}$ me niemand$_j$ $t_i$ [$_{VP}$ $t_i$ ketent $t_j$]] (en-)was$_i$ | {** | ✓ | -} | * | ✓ |

Here we ignore the issue of the optional head: if the head is inserted there will be one more violation of Insert in both cases and if it is not, there will be a violation of Head in both cases. This makes no difference to the issue of the optimality of the DN and NC structures. The NC structure inserts only one NgP and hence violates Insert once. However, as a result, both operators have to share the same specifier position, in violation of UniSpec. For the DN structure, both operators are provided with their own scope position, but at the expense of an extra Insert violation. Once more, it is obvious how the more violations of UniSpec there are, the fewer violations of Insert there will be, and *vice versa*, and therefore this analysis extends to more complex cases where there are more negative operators.

## 6.0 CONCLUSION

Under the assumptions of OT that constraints are not inviolable but are ranked with respect to each other to determine which violations are acceptable and which are not, I have proposed an analysis that elegantly captures certain negative phenomena in three diverse languages. The main advantage of this analysis over other possible accounts is precisely that it allows constraints to be violated in certain circumstances: if constraints were inviolable either more complicated constraints would have to be proposed or we would have to invent complicated conditions on when such constraints are applicable. Optionality is another problem with non-violable constraints: how can constraints be both applicable and non-applicable in any one language? As we have seen OT provides a very simple way of accounting for optionality through the (non)ranking of the constraints.

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# LANGUAGE BREAKDOWN: IMPLICATIONS FOR THE THEORY OF FUNCTIONAL CATEGORIES

**Monica Eszter Sanchez**

Department of Linguistics
University of British Columbia

## 1.0 AGRAMMATISM AND SYNTACTIC THEORY

Broca's aphasia results from damage to the anterior portion of the left hemisphere of the brain (Broca's area). Agrammatism is the linguistic syndrome that is usually associated with Broca's aphasia. The most striking characteristic of agrammatic speech is the omission, substitution and avoidance of 'function' words and grammatical morphemes, resulting in 'telegraphic' speech. Although the current consensus is that agrammatics have difficulties with functional categories in general (Caplan, 1987; Grodzinsky, 1984b, 1990), systematic studies of specific functional categories are scant (Grodzinsky, 1988, 1991; Hofstede & Kolk, 1994), with virtually no attention being paid to the functional categories within the noun phrase. The goal of this paper is to investigate agrammatic production of nominal functional categories, compare it to agrammatic production of verbal functional categories, and consider the theoretical implications of these findings.

Although agrammatism is characterized by omissions, substitutions and avoidance of specific morphemes, this paper will focus on the omission errors produced by agrammatics of various languages. The utterances in (1) illustrate omissions in the speech of an English agrammatic, where omissions are indicated by square brackets '[]'. In (2) we have examples of omissions in French (a), Italian (b), Dutch (c).

(1) Sanchez (1992)
a. [he] is riding his kite
b. the man carries [a] suitcase
c. [the] witch [is] stirring the brew
d. [the] man feed[s] the dog
e. who [is] playing the violin
f. the woman calls [the] boy

(2)
a. peu après [il] contemple [la] récolte — Nespoulous et al (1990)
little after [he] gazes at [the] harvest

b. Io [sono] stanco di stare qui — Miceli et al (1983)
I [am] tired of being here

c. de man geef[t] de bal aan de jongen — Kolk et al (1982)
the man give[s] the ball to the boy

Grodzinsky (1990) argues that theoretical models of grammar are subject to 'external' constraints: they must be parsable, learnable, and breakdown-compatible. More specifically, a grammatical theory must be able to account for language breakdown. As stated above, agrammatics have difficulties with functional categories. In keeping with the breakdown-compatibility constraint, I argue that the theoretical distinction between functional and lexical categories is, therefore, a necessary one. Moreover, I provide evidence for the distinction between verbal and nominal categories, so that I may account for the greater difficulty that agrammatics have with verbal elements.

## 2.0 FUNCTIONAL VERSUS LEXICAL CATEGORIES

### 2.1 Two Models of Categorial Features

Chomsky (1970) observed a distinction between lexical and functional categories and captured this distinction with the use of features. He presented a model whereby syntactic categories are projections of features: it is the feature [+/– Functional] which results in the Functional-Lexical distinction. Although everyone agrees that syntactic categories are made up of features, the debate revolves around which features are relevant to syntactic categories.

Let us turn to the syntactic distinction between functional and lexical categories presented by Fukui (1986) and Abney (1987). For Fukui, every category has precise featural specifications, as shown in (3).

(3)

| | | [–Functional] | | [+Functional] | |
|---|---|---|---|---|---|
| | | [–Kase] | [+Kase] | [–Kase] | [+Kase] |
| [–Verbal] | [–Nominal] | | **P** | **C**<br>that | **C**<br>+WH |
| | [+Nominal] | **N** | | **D**<br>the | **D**<br>'s |
| [+Verbal] | [–Nominal] | **V**<br>unacc | **V**<br>trans/unerg | **I**<br>to | **I**<br>Tns/Agr |
| | [+Nominal] | **A** | | | |

Abney, on the other hand, proposes a much smaller set of features, as in (4).

(4)

| | [–Functional] | [+Functional] |
|---|---|---|
| [–Nominal] | V, Aux, P | I, C |
| [+Nominal] | N, A, Q, Adv | D, Deg |

Following Chomsky (1970), both Fukui and Abney capture the lexical-functional distinction by having lexical categories defined as [–Functional] and functional categories defined as [+Functional]. However, several problems arise with respect to these models. First, the abundance of features proposed by Fukui leaves us with 'empty slots': we expect to find the [+Kase] counterparts to A and N, for example. With Abney's model, a problem opposite to Fukui's arises: too many distinctions are collapsed. For languages like English, A and N are different and need to be identified as such.

A second point of concern has to do with the bivalent nature of these features. Having both [+] and [–] values of each feature forces us to stipulate which value is to be selected for a given syntactic process. If, on the other hand, features are privative, then necessarily it is the feature that is present that is selected for a given syntactic process. No stipulation is required (the model of categorial features that is adopted below includes the notion of privative features)[1].

Despite these criticisms, the fundamental distinction between lexical and functional categories remains. It is this distinction that is consistent with the agrammatics' differential treatment of these categories.

2.2 Agrammatic Behavior

Let us consider the agrammatic production of lexical and functional categories. The table in (5) shows the omission and substitution rates of an English agrammatic speaker. This data from Menn (1990) reveals that 60% of functional categories are omitted whereas only 4% of lexical categories undergo such a loss. Functional categories suffer a much higher rate of omission.

(5)

| | **Context** | **Omission - %** | **Substitution - %** |
|---|---|---|---|
| functional categories | 192 | 115 - **60%** | 7 - 4% |
| lexical categories | 206 | 9 - **4%** | 9 - 4% |

The table in (6) illustrates a different aspect of the lexical-functional distinction. In (6) we see that for the Chinese speakers in Packard (1990) 42.5% of morphemes produced by agrammatics are functional categories, whereas 51.9% of morphemes produced by the normal controls are functional categories. Functional categories are significantly underproduced by agrammatics as compared to the normal controls. This reveals an avoidance strategy adopted by agrammatics, which, once again, indicates a distinction between lexical and functional categories.

(6)

| | **Agrammatic** | **Control** | |
|---|---|---|---|
| functional categories | 42.5% | 51.9% | sig < |

Any model of syntactic categories must be consistent with these facts. In order to account for the agrammatic treatment of functional categories, a syntactic distinction between lexical and functional categories is required. The models of categorial features presented in 2.1 are both consistent with the agrammatic data since they distinguish between lexical and functional categories: lexical categories are [– Functional]; functional categories are [+ Functional].

3.0 NOMINAL AND VERBAL PARALLEL

3.1 The Theory

As stated above, Chomsky (1970) captures categorial distinctions with the use of syntactic features. These features include [+/– Nominal], which distinguishes between nominal and verbal categories. Even Abney (1987: 60) states that "the noun-verb distinction [is] the most fundamental categorial distinction". Despite this division between nominal and verbal elements, the current trend has been to argue for a strong parallel between nominal and verbal structures (Abney, 1987; among many others).

Lees (1960) was among the first to discuss the parallel between sentences and noun phrases. He showed that sentences and noun phrases are similar in external distribution.

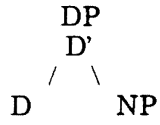
(7) a. *Carmina* surprised me.
b. *That Carmina played the kazoo* surprised me.

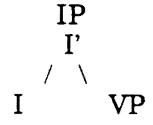
(8) a. I know *Carmina*.
b. I know *that Carmina played the kazoo*.

(9) a. [*Carmina* ]$_1$ was known $t_1$ by many
b. [*That Carmina played the kazoo* ]$_1$ was known $t_1$ by many.

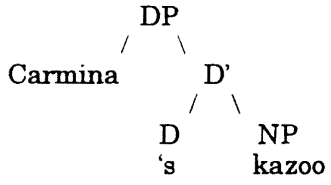
In (7), both a noun phrase, *Carmina*, and a sentence, *That Carmina played the kazoo*, serve as subject. In (8), these same elements are objects. And in (9), they both undergo movement to subject position of a passive.

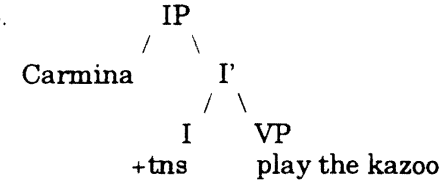
Following Lees, Abney (1987) draws a parallel between sentences and noun phrases and proposes that a functional element serves as head of the traditional noun phrase. In other words, *the dog* projects a DP headed by *the*, just as the tensed verb phrase projects an IP headed by the inflectional element Infl. More specifically, NP is the complement of the functional head D much in the same way as VP is the complement of the functional head I(nfl), as shown in (10).

(10) a.



b.



If DPs and IPs do function in a similar fashion, then subject-predicate relationships will have a similar structure and ought to have matching properties. The most notable example is the English Genitive construction, where the 'subject' of the noun occupies the [Spec DP] position in the same way that the subject of a verb occupies the [Spec IP] position.

(11) a.



b.



Abney's proposal matches nominal functional categories to verbal functional categories[2]. Each of the dominating categories becomes the extension of the nominal or verbal phrases: IP (and CP) is the extended projection of VP; DP (and FP) is the extended projection of NP[3]. This is schematized in (12).

(12) Nominal extended projection: [FP F [DP D [NP N
Verbal extended projection: [CP C [IP I [VP V

The extended projections of NP and VP, having parallel structures, are, therefore, expected to exhibit parallel behavior.

3.2 Agrammatic Behavior

It has been shown for a wide variety of languages that agrammatics display significantly greater difficulty with verbal functional categories than with nominal functional categories. Kolk et al. (1982) found that in a specific Dutch agrammatic speaker verb inflections are frequently omitted whereas nominal inflections are never omitted. For English, Jakobson (1964) found agrammatics to have greater difficulty with verbal inflection than with nominal inflection: 3rd person singular *-s* and past *-ed* showed more omissions than plural *-s*. For both Hebrew and Italian agrammatics, verbal inflections are more often wrong than nominal inflections (Hebrew - Grodzinsky, 1982; Italian - Miceli et al., 1983). This behavior is not predicted by extant theories, which all maintain a parallel between verbal and nominal functional categories.

Let us take a closer look at the specific data. The tables below show the percentage omission (and substitution) of each of the categories presented in the left-most column. In each of the tables, the nominal categories are better retained than the verbal elements[4].

(13) Nominal and Verbal Omission and Substitution Pattern: Dutch patient #1
Kolk et al. (1990)

| | **Context** | **Omission - %** | **Substitution - %** |
|---|---|---|---|
| noun | 104 | 2 - **1.9%** | |
| article | 45 | 36 - **80.0%** | 1 - 2.2% |
| lexical verb | 91 | 17 - **18.7%** | |
| auxiliary | 57 | 52 - **91.2%** | |

(14) Nominal and Verbal Omission and Substitution Pattern: Dutch patient #2
Kolk et al. (1990)

| | **Context** | **Omission - %** | **Substitution - %** |
|---|---|---|---|
| noun | 148 | 4 - **2.7%** | |
| definite article | 76 | 21 - **27.6%** | 2 - 2.6% |
| indefinite article | 16 | 7 - **43.8%** | |
| other determiner | 20 | 1 - **5.0%** | |
| lexical verb | 81 | 31 - **38.3%** | |
| auxiliary | 34 | 23 - **67.6%** | |

Both Dutch patients have greater difficulties with verbal elements than with nominal elements. Dutch patient #1 omits 1.9% of nouns, and 18.7% of verbs. Dutch patient #2 omits 2.7% of nouns, and 38.3% of verbs. When we look at the functional categories within the nominal and verbal projections, we see that this trend is maintained. Whereas articles, which are nominal functional categories, have an 80% omission rate for Dutch patient #1, auxiliaries, which are verbal functional categories, have an omission rate of 91.2%. Dutch patient #2 shows a similar pattern, with determiners exhibiting a range of omission from 5 to 43.8%, and with 67.6% of auxiliaries being omitted.

(15) Nominal and Verbal Omission and Substitution Pattern: German patient
Stark & Dressler (1990)

| | **Context** | **Omission - %** | **Substitution - %** |
|---|---|---|---|
| noun | 95 | 3 - **3%** | |
| definite article | 96 | 11 - **10%** | 19 - 19% |
| lexical verb | 100 | 13 - **13%** | 6 - 6% |
| auxiliary have/be | 14 | 7 - **50%** | 2 - 14% |

The German patient has greater difficulties with verbal elements than with nominal elements. He omits 3% of nouns, and 13% of verbs. When we look at the functional categories within the nominal and verbal projections, we see that this trend is maintained. Whereas definite articles, which are nominal functional categories, have a 10% omission rate, auxiliaries, which are verbal functional categories, have an omission rate of 50%.

(16) Nominal and Verbal Omission and Substitution Pattern: English patient #1
Menn (1990)

| | **Context** | **Omission - %** | **Substitution - %** |
|---|---|---|---|
| noun | 92 | 1 - **1%** | 1 - 1% |
| article | 66 | 4 - **6%** | |
| lexical verb | 69 | 3 - **4%** | 6 - 12% |
| auxiliary | 35 | 9 - **28%** | 1 - 2% |

(17) Nominal and Verbal Omission and Substitution Pattern: English patient #2
Menn (1990)

| | Context | Omission - % | Substitution - % |
|---|---|---|---|
| noun | 139 | 3 - **2%** | 3 - 1% |
| definite article | 47 | 22 - **47%** | 3 - 6% |
| indefinite article | 16 | 9 - **56%** | |
| lexical verb | 51 | 6 - **12%** | 6 - 12% |
| auxiliary | 5 | 5 - **100%** | |

Both English patients have greater difficulties with verbal elements than with nominal elements. English patient #1 omits 1% of nouns, and 4% of verbs. English patient #2 omits 2% of nouns, and 12% of verbs. When we look at the functional categories within the nominal and verbal projections, we see that this trend is maintained. Whereas articles, which are nominal functional categories, have an 6% omission rate for English patient #1, auxiliaries, which are verbal functional categories, have an omission rate of 28%. English patient #2 shows a similar pattern, with determiners exhibiting a range of omission from 47 to 56%, and with 100% of auxiliaries being omitted.

It was predicted that the extended projections of NP and VP exhibit parallel behavior. We would, therefore, expect nouns and determiners to show rates of omission similar to their respective verbal counterparts, verbs and auxiliaries. However, the reality is that agrammatics exhibit greater difficulty with verbal categories than with nominal categories.

## 4.0 NOMINAL AND VERBAL FUNCTIONAL CATEGORIES ARE DIFFERENT

### 4.1 The Theory

As stated above, the theoretical construct that is discussed in this paper is that of categorial features. The specific categorial model that is adopted is Déchaine (1993), presented in (18) below.

(18)

| | C | T | V | K[5] | D | N | P | A |
|---|---|---|---|---|---|---|---|---|
| Nominal | | | | + | + | + | | + |
| Referential[6] | | + | + | | + | + | | |
| Functional | + | + | | + | + | | | |

Déchaine's (1993) feature system captures both the functional-lexical and the nominal-verbal distinctions: functional elements are [+Functional]; nominal elements are [+Nominal]; lexical and verbal elements are unspecified for [Functional] and [Nominal], respectively. Déchaine differs from Fukui (1986) and Abney (1987) in two ways. First, she adopts the features [Referential], [Functional], and [Nominal]. Déchaine has fewer features (and consequently distinctions) than Fukui, but more than Abney. The second way in which she differs from them is in her use of privative features, which, as was argued in section 2.1 , is preferred to bivalent features.

### 4.2 Agrammatic Behavior Revisited

To begin, let us recall that agrammatics omit/substitute functional and verbal categories. Put differently, they retain lexical and nominal categories. For a unified featural account of agrammatic behavior we must have the features [Functional] and [Verbal] OR [Lexical] and [Nominal] (each of the two possibilities are considered below). (18) above has the features [Functional] and [Nominal]. These features do not account for the agrammatic deficit. A revised set of features is required: one feature must be changed.

Agrammatism can be characterized in one of two ways: either agrammatics have difficulty accessing specified categories, or agrammatics can better access specified categories. Let us consider the first option whereby agrammatics <u>have difficulties accessing</u> specified categories. The more

features a category has, the more specified it is. The more specified it is, the less well retained it is. Since functional and verbal elements are less well retained in agrammatic speech, the required features for this approach to the deficit are [Functional] and [Verbal]. Functional elements are [Functional], and lexical elements are unspecified for this feature. Verbal elements are [Verbal], and nominal elements are unspecified for this feature. The resulting categorial table is shown in (19).

(19)[7]

| | C | T | V | K | D | N | P | A |
|---|---|---|---|---|---|---|---|---|
| Verbal | √ | √ | √ | | | | √ | |
| Referential | | √ | √ | | √ | √ | | |
| Functional | √ | √ | | √ | √ | | | |

This model predicts that the fewer features a category has the better retained it will be (by an agrammatic). If we compare nouns and verbs, we see that nouns have fewer features than verbs, and are, therefore, predicted to be better retained than verbs. As argued above, this is indeed the case. This model, in fact, predicts the following hierarchy of retention, where ">" means "better retained than".

(20) A > N, P, K > V, D, C > T

This hierarchy predicts that adjectives will show the best retention. This prediction is not borne out (Sanchez, 1994).

Let us now consider the second alternative, whereby agrammatics can <u>better access</u> specified categories. Once again, the more features a category has, the more specified it is. But now, the more specified a category is, the better retained it is. In other words, specified categories are more robust than unspecified categories. Since lexical and nominal elements are better retained in agrammatic speech, the required features for this approach to the deficit are [Lexical] and [Nominal]. Lexical elements are [Lexical], and functional elements are unspecified for this feature. Nominal elements are [Nominal], and verbal elements are unspecified for this feature. The resulting categorial table is shown in (21).

(21)

| | C | T | V | K | D | **N** | P | A |
|---|---|---|---|---|---|---|---|---|
| Nominal | | | | √ | √ | √ | | √ |
| Referential | | √ | √ | | √ | √ | | |
| Lexical | | | √ | | | √ | √ | √ |

This model predicts that the more features a category has (the more robust it is) the better retained it will be (by an agrammatic). If we compare nouns and verbs, we see that nouns have more features than verbs, and are, therefore, predicted to be better retained than verbs. As argued above, this is indeed the case. The hierarchy of retention that this particular model predicts is presented in (22).

(22)[8] N > V, A, D > P, T, K > C

This hierarchy predicts that nouns are the most robust category and, therefore, will show the best retention. Nouns are indeed the category best retained in agrammatism. The fact that this most basic prediction is supported, whereas that of the hierarchy in (20) is not, argues in favor of the feature model in (21), where [Nominal], [Lexical], and [Referential] are the necessary features[9].

## 5.0 CONCLUSION AND FURTHER RESEARCH

This paper serves as a bridge between theoretical linguistics and the clinical disciplines. On the one hand, we used grammatical theory to account for certain aspects of the language deficit of agrammatism. On the other, we adopted agrammatic production as a data base with which to test and constrain the grammatical theory.

We saw that two distinctions are relevant to agrammatism: the lexical-functional and nominal-verbal distinctions. In order to provide a unified account of the two distinctions, I adopted the independently motivated theoretical construct of categorial features, whereby syntactic categories are projections of features (Chomsky, 1970). This paper turned to Déchaine's (1993) feature system, which captures the relevant distinctions using the privative features [Nominal], [Functional], and [Referential]. I argued that [Lexical] had to replace [Functional] if the feature system were to account for the agrammatic data. With this final model, I provided an account of agrammatism in which agrammatics better retain categories that have a more robust feature specification. This account produced a retention hierarchy which makes predictions about which categories will be better retained. Needless to say, further research on agrammatic production is necessary in order to test the retention hierarchy with respect to agrammatism, and possibly other language deficits.

## NOTES

1 See Déchaine (1993) for a more thorough critique of Fukui's and Abney's featural models.

2 For a more detailed account of the evidence for the DP/IP parallel see Abney (1987) and Szabolcsi (1983, 1987).

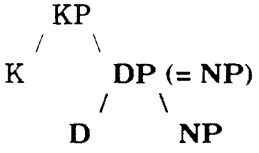
3 For a thorough explanation of extended projections, see Grimshaw (1991).

4 The implication is that determiners are the nominal counterpart of auxiliaries. For a thorough look at this issue see Sanchez (in progress).

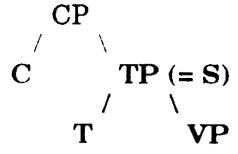
5 K = Kase, as in *of* in *Carmina is fond of kazoos*; where *of* has no semantic content, unlike prepositions. For more details see Déchaine (1993).

6 [Referential] is required to distinguish between categories that have privileged relationships and categories that do not. (For technical detail cf. the issue of extended projections in Grimshaw (1991)).

a.




b.




N and D have a privileged relationship, where the entire extended projection of DP represents what was traditionally labelled NP. V and T have a privileged relationship, where the entire extended projection of TP represents what was traditionally labelled S. K, C, P, and A, on the other hand, are not involved in privileged relationships.

7 Although both Det and Tense are independent categories, they are actually extensions of the nominal phrase and verbal phrase respectively. There is a correlation between the loss of verbs and the loss of verbal functional categories; thus, teasing apart the two types of omissions is quite difficult.

8 There seems to be tension between the number of features and the type of features that a category is specified for. This may indicate the need for a Feature Hierarchy, whereby some features are 'stronger' than others. The hierarchy that I wish to propose is the following: Lexical > Referential > Nominal. However, this paper focuses on the influence that robustness has on how agrammatics treat specific categories. The study of featural weight will have to be postponed to a later date.

9 For a detailed account of which features are relevant to agrammatism, see Sanchez (in progress).

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# SHIFTS IN TABOO LOADING

**Murray Schellenberg**

Department of Linguistics
University of Victoria

## 1.0 INTRODUCTION

Swearwords, like their more respectable kin, are subject to linguistic change. The change does not, however, have to be strictly semantic. On a lesser scale there is evidence of shifts in what has been termed the 'taboo loading' of these words.

## 2.0 TABOO LOADING

'Taboo loading' is a term used by Brian Taylor in his description of Australian swearwords (1976). This is a way of describing the concept that, within the limited class of swearwords, some words are considered 'worse' than others. Taylor provides a ranking of seven levels of taboo loading with a ranking of '6' being the most taboo/offensive and '0' being the least so.

(1)

| | taboo load | noun ±animate |
|---|---|---|
| swearwords | 6 | cunt |
| | 5 | bastard |
| | 4 | bugger |
| quasi-swearwords | 3 | bludger |
| | 2 | swine<br>rat<br>stinker |
| | 1 | dog<br>cow<br>pig<br>coot<br>'B'<br>devil |
| | 0 | beast<br>beggar |

(excerpt from Table B, p. 57)

Table one provides an excerpt from Taylor's original table. Taylor divides the terms into 'swearwords' and 'quasi-swearwords' with a column for words with the same referent/topic. He proposes that individuals may vary as to the relative ranking of terms and the division between swearwords and quasi-swearwords. Usage also varies. One speaker, for example, may never use terms ranked higher than three whereas another speaker may find those terms completely ineffective for vehemence and rely on higher ranking terms.

## 3.0 SHIFTS IN TABOO LOADING

The purpose of this paper is to examine shifts in taboo loading over time. I propose that the loading of any specific word is not fixed diachronically. The taboo loading can shift with time, the word becoming either more or less offensive. These shifts can occur in a relatively short period of time. Another way of viewing this would be to say that general levels of offendedness[1] have shifted with time.

This seems to make sense intuitively. Most people would probably agree that such changes have occurred during their own lifetimes. Anecdotal evidence for this is easy to find. Even within the literature it appears to be a standard assumption that the reactions of earlier generations do not match our own. Jay (1992), discussing a study conducted by McGinnies in 1949 where subjects were asked to write words which were flashed very briefly on a screen, comments "imagine having to say a word like 'bitch' or 'kotex' in a psychology experiment in 1949!" (p. 171).

As a preliminary study of this shifting I looked at a sample of academic papers dealing with swearwords. The dates of the papers ranged from the turn of the twentieth century to current publications. What I wanted to know was what words were viewed as swearwords and what were the attitudes, explicit or implicit, expressed towards them at varying times throughout the century. I worked with the assumption that academics would try to reflect (unconsciously, perhaps) the usage and opinions of the time.

### 3.1 Pre-WW II

The first paper (chronologically speaking) is "The Psychology of Profanity" by Prof. G. T. W. Patrick (1901). Patrick includes in his paper a typology of swearwords. He lists seven categories:

(2)

1. Names of deities, angels and devils
2. Names connected with the sacred matters of religion
3. Names of saints, holy persons or biblical characters
4. Names of sacred places
5. Words relating to the future life (heaven, hell)
6. Vulgar words
7. Expletives

(pp. 114-115)

As can be seen, his categories are primarily religious. The category of 'expletive' he defines as "words or phrases having unusual force ... Many of these will be found to be fossil remains of religious terms or of ejaculatory prayers" (p. 115). His examples include terms such as 'mercy', 'gracious', 'confound it' and 'hang it'. Religious swearwords are the main focus of his paper. He sprinkles them liberally throughout the paper, including amusing anecdotes and such, with no apparent compunction about writing them out in full. The notable exception is his sixth category of vulgar words. These get only the vaguest reference. They are defined as "words or phrases unusual or forbidden by polite usage" (loc. cit.)--which seems to imply the other six categories are not unusual or forbidden. This is the only category without examples and in the subsequent discussion the unknown words get only three carefully worded sentences to explain their use (p. 126). It can only be assumed that the words in question are those that are often called the "four-letter words", viz. 'fuck', 'shit', 'bitch' and similar terms.

Macy wrote in 1923 about editorial "mutilation" of swearwords. He coins the term "disenvoweling" (p. 594) to describe the frequent substitution of a dash for the vowel in a word deemed offensive. Macy argues for full publication and practices what he preaches but his only examples are religious; presumably the only examples he could fine. He cites 'hell', damn' 'God', 'Jesus Christ', 'zounds' and 'Ecod' (which he states is "now rare" (p. 596)) but there is no reference to anything similar to Patrick's "vulgar" words.

There do occur cases of reference with no representation. Graves (1927) prints religious swearwords freely. He also has no objection to publishing the word 'bastard' which he defines as lower class (p. 17) but he refuses to put the word 'bugger' in print. He discusses the word and goes to elaborate lengths to let the reader know which word he is talking about--"the other common word in 'b.', which originally meant a Bulgarian heretic, but later implied 'one addicted to unnatural vice'" (p. 18)--but the word is never mentioned directly.

A similar process is found in work by Allen Read (1934) who published an entire paper on the word 'fuck' in which the word itself is never once mentioned. The following year (1935) Read published a short monograph on graffiti which he had collected in the late 1920's and early 1930's. The profanity included in this collection is almost exclusively non-religious swearwords fully printed in glorious black-and-white. Graffiti has changed little in the past sixty-five years. Reactions to it, though, have. Read warns the reader that "(j)udged merely as reading matter...(the book)...is abominably, incredibly obscene."(pp. 5-6). My own reaction, as a 28 year old in 1995, was not one of shock, disgust or titillation but of curiosity and amusement. In the bibliographic section Read talks about the difficulty he had getting it published (pp. 28-29). It finally had to be printed privately in Paris and was limited to 75 copies. It didn't get a wider circulation until it was re-issued by Maledicta Press in 1977! This work is invaluable in a study such as this because it establishes the usage of 'vulgar' terms at that time. Most words are familiar; included are the full gamut of sexual and scatological terms. It provides evidence of common usage of what are generally termed the 'four-letter words' which get little or no mention in other discussions of the period. The difficulty of publication and the careful defense of the work in its opening chapters indicate that these words were highly charged (at least when printed in a book) and probably had a very high taboo loading.

3.2 The 1940s and 1950s

While wars have been blamed for the 'relaxation' of attitudes towards swearing, change during and after the second world war seems to have been slow. Menken (1944) discusses the four high occurrence religious swearwords ('hell', damn', 'God', 'Jesus Christ' and their various combinations) but does not include any reference to the 'four-letter words'. We do see, however, the start of recognition of taboo-loading in another category of words--the slur. Menken discusses terms which were acquiring status as invectives: 'Bolshevik', 'communist', 'fascist', 'isolationist', 'anti-Semite', 'Nazi' and 'New Dealer'.

Taylor's paper (1976) also falls into this time period. Although the paper was written and published in the 'seventies', he acted as his own informant and places himself firmly in this period. Even allowing for the mellowing passage of time, his attitude towards the terms he discusses is worth mention. He deals with the words in a straightforward and direct manner but he is acutely aware of the offensive nature of the words. He compromises by writing the words out phonetically. He includes both religious and nonreligious terms but non-religious terms predominate, something of a change and a hint of things to come.

3.3 From the 1960s On

Here the shift is fairly noticeable. Words such as 'fuck' and 'shit' (the four-letter words) are seen in almost any study on taboo language from the 'sixties' on. Religious terms are generally limited to 'hell', 'damn', 'God', and 'Jesus Christ'. All words are usually written out in full although there are still occasional exceptions. Selnow (1985) presents a study using "sixteen items on a list of profane words" (p. 307) but we never find out what these items are. However avoidance of printing swearwords in full has become the exception.

It is interesting to compare Prof. Patrick's (1901) taxonomy with that of A. Ross Eckler (1987). Eckler divides the subject matter of taboo words into four categories:

(3)

1. sexual functions (obscenities)
2. defecation and urination (scatologies)
3. physical or mental characteristics of other groups (slurs)
4. deities (blasphemies)

(p. 203)

Patrick's five religious categories have been conglomerated into one while his 'vulgar terms' have been subdivided. Ecklers's third category, slurs, appears marking its more recent addition to the field. Timothy Jay includes discussion of these slurs quite extensively in his book *Cursing in America* (1992) and Pamela Munro, in the introduction to *Slang U* (1989) says:

(4)

> We have tried to be especially careful to mark words that may be offensive to members of minority groups: interestingly, these words, and words considered sexist seem to arouse far more emotional response among UCLA students surveyed, and the members of our class, than do the traditional four-letter words on the list.
>
> (p. 12).

These slurs and similar comments on the 'difference' of an individual, would seem to be the new 'truly taboo' words. An interesting realization of this could be seen in the media's (particularly television's) grappling with Mark Fuhrman's use of the word 'nigger' during the O.J. Simpson trial. My own sporadic observations seemed to show that the 'serious' news shows played the tape excerpts unedited but the more 'popularist' tabloid shows 'bleeped' all occurrences. Perhaps "the N-word" (as it was frequently called) is acceptable as news but unacceptable as entertainment. Its status is certainly in question.

## 4.0 DISCUSSION

The sample of papers used herein should not be considered exhaustive, merely representative. These papers offer support to the view that swearwords have had changing taboo loadings in the past century. Often the same words appear but the attitudes towards them have changed with time. The words discussed freely in the first half of the century have died, if not out, then at least down. The words scrupulously avoided by those earlier scholars are now the grist of contemporary study along with a new (and somewhat avoided) type of 'high offense' term--the slur. This may seem an obvious observation when taken in isolation but it is something which ought to be borne in mind when studying taboo language. Shifts in taboo loading have occurred quite rapidly; well within the span of a lifetime. The language of the younger generation often seems to shock their elders. This is easily understood if general levels of offendedness have shifted with time. Perhaps the desire to shock is what causes the shifts. Such shifts may affect the perception of varying age groups and ought to be taken into account in studies with samples which cross generational boundaries.

If, in fact, this is the case, it raises a problem with the present study. It has been virtually impossible to control for the ages of the authors of the various articles. Taylor (1976) seems instinctively aware of this generational variable and, as previously mentioned, places himself in the time period of his own linguistic development. This is not possible with the other authors. It can only be assumed that the papers reflect the usage, at the date of publication, of the young adult to middle-age age bracket.

The shifts seen in the course of this paper indicate that, in terms of what I may call 'popular' swearing[2]--words or expressions generally regarded as taboo yet with reasonably high frequency--religious blasphemy seems to be dying out. It is being replaced by scatological and sexual obscenity. This is not to say that sexual terms have lost their clout or that religious terms will not offend. It is just that the mass cultural concept (if such a thing exists) of what a 'swearword' is, has changed with the decades. The psychological reasoning behind this is really beyond the scope of this paper but it is difficult to resist hazarding a guess. It may be that popular swearing reflects a shared taboo base which all of a society's members agree should not be mentioned in 'polite society' but

about which everyone is aware. With an increase in global communication and a freer interaction of cultures, the role of religion seems to have declined significantly. It is no longer a certainty that a group of people within our own culture share even a broad set of religious beliefs. On the other hand, the 'sexual revolution' opened the way for greater acceptance of sexual matters. It is now considered acceptable to discuss one's sexual problems in public, preferably on a daytime television talk show. Sex has lost much of its privacy and also much of its taboo. This seems to be reflected in the swearwords commonly heard today. People maintain the old facade of "we don't talk about sex" although everyone actually knows this to be a fallacy, a kind of grand joke that everyone is in on.[3]

On the other side of the coin, there is the shift in "offensive swearing" as well. The words which once caused extreme offense and discomfort ('fuck', 'shit', 'bitch', etc.) have lost some of their bite but have been replaced by terms which draw attention to people's differences ('nigger', perhaps 'fag' and I would also include terms like 'cunt' which, while still sexual, also emphasize gender). This may be a kind of extension of, or reaction to, political correctness.

## 5.0 CONCLUSION

An examination of papers of various dates, all purporting to deal with swearing, were examined with the aim of finding systematic changes over time. It was supposed that the papers would reflect the 'popular swearing' of the time of publication and could be used to support the hypothesis that the taboo loading of swearwords shifts over time. The papers examined did, in fact, offer evidence to support this view. They suggest that the scope of popular swearing has shifted from religious to sexual and scatological terms. There also seems to be an emerging category of 'slurs' which are seen as increasingly offensive.

"The line between decency and indecency is an ever-shifting one and merits unremitting investigation" (Allen Walker Read (1935) p.5.)

## NOTES

1 See Jay (1992) for a full discussion of offendedness (that which offends society) vs. offensiveness (that which offends an individual).

2 See Graves (1927), p. 48 for a similar usage.

3 Tiefer (1995), in her first chapter, offers an interesting discussion on the changing role of marriage/relationships from economic necessity to companionship.

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# REFERENCE TIME IN DISCOURSE

**Takashi Suzuki**

Information-Technology Promotion Agency, Japan

## 1.0 INTRODUCTION

As is discussed in Partee (1984), while a event-describing sentence can put reference time forward in a discourse, a state-describing sentence cannot. This paper attempts to account for this difference between event-describing sentences and state-describing sentences by assuming event to be gestalt which consists of at least two distinct non-overlapping states and each state in events to need at least one point of time in order to obtain. This means that while a state can obtain at a particular moment, an event needs an interval which includes several distinct points in time in order to occur. The overall organization of this paper is as follows: in section two, we will introduce the notion of events and states into our ontology. In section three, we will examine how movement of the reference time in discourse can be treated in our framework. Finally, in section four, we will discuss the results of these investigations and draw some generalizations.

## 2.0 EVENTS AND STATES

### 2.1. Characterizations of Events and States

Following Galton (1984), we introduce the notion of events and states into our ontology. Galton argues that while events involve change of state, states are essentially unchanging. It should be noted that Galton claims that the situations described by a English progressive sentence are included in its state. Hereafter, we use the term "state" or "event" in Galton's sense.

According to Galton, for the evaluation of (1a, b), state-describing sentences, one point of time is enough, but the evaluation of (2), an event-describing sentence, needs an interval which contains some points of time. According to Galton, this difference between event-describing sentences and state-describing sentences comes from whether they involve change of state or not:

(1) a. He is running.
    b. He is dead.

(2) He runs.

Galton argues that although what the subject denotes in the state described by (3) is changing with respect to its position, the state itself is not changing:

(3) It is moving.

### 2.2. The Internal Structure of Events

We claim that every event can be viewed as a gestalt which consists of two or three states. Here, we use the term "gestalt" in Lakoff's (1977) sense. According to Lakoff, gestalt is a whole that we human beings find more basic than the parts.

According to Galton, every event contains at least two non-overlapping states: a state which obtains before the change and a state which obtains after the change. Henceforth, we call these two states an initial state and a final state, respectively. Some events contain a state of change, in addition to these two states. In this respect, we distinguish two classes of events. One consists of those events which contain a state of change, in between an initial state and a final state, and the other consists of those events which do not contain a state of change. See (4) below:

(4) a.

| initial state | state of change | final state |
|---|---|---|

b.

| initial state | final state |
|---|---|

An example of events that might be classified as (4a) is the event described by (5):

(5) A banana ripens.

According to Galton, we cannot draw a clear line between the bananas that have ripened and the bananas that have not ripened yet, and consequently, the event described by (5) is perceived to contain a gradual change. This gradual change corresponds to a state of change in our framework. An example of events that might be classified as (4b) is the event described by (6):

(6) The car starts moving.

In (6), the change is recognized by the observation of the difference between the initial state and the final state:

We examine how Vendler's (1967) classification of verbs can be considered in our framework. Vendler claims that verbs can be classified into the four groups listed in (7). Although Vendler himself said that this is a classification of verbs, we regard these classes as those of situations:

(7) a. state
b. accomplishment
c. activity
d. achievement

Examples of these classes are shown in (8) below. (8a-d) correspond to (7a-d), respectively:

(8) a. He was dead.
b. He made a chair.
c. He ran.
d. He reached to the top of the mountain.

We consider that (7a) is contained in state as Galton understands it, (7b) corresponds to (4a), and both (7c) and (7d) are contained in (4b). At first sight, it might seem odd to suppose that (7c) is contained in (4b), but this is right. We think that the difference between (7c) and (7d) is that while the final states of those events classified as (7d) represent a static situation, the final state of those events classified as (7c) represent types of motion. For example, the event described by (8c) can be considered to consist of an initial state where the object denoted by "he" is not in running activity and a final state where "he" is engaged in a running activity.

According to Vendler, while the progressive form of activity verbs entails their non-progressive counterparts, the progressive form of accomplishment verbs does not have such an entailment. For example, while (9a) entails (8c), (9b) does not entail (8b):

(9) a. He was running.
b. He was making a chair.

We consider here that (9a) describes a final state and (9b) describes a state of change, respectively. Therefore, it is quite natural for (9a) to entail (8c), because the state described by (9a) can be assumed to obtain after the event described by (8c) has occurred. On the other hand, (9b) does not

entail (8b), because the state described by (9b) is not perceived as obtaining after the event described by (8b) has occurred.

## 3.0 MOVEMENT OF REFERENCE TIME

As is discussed in Partee (1984), while events can put the reference time forward in a discourse, states cannot. Consider (10) below. Here, "e" and "s" indicate event-describing sentences and state-describing sentences, respectively:

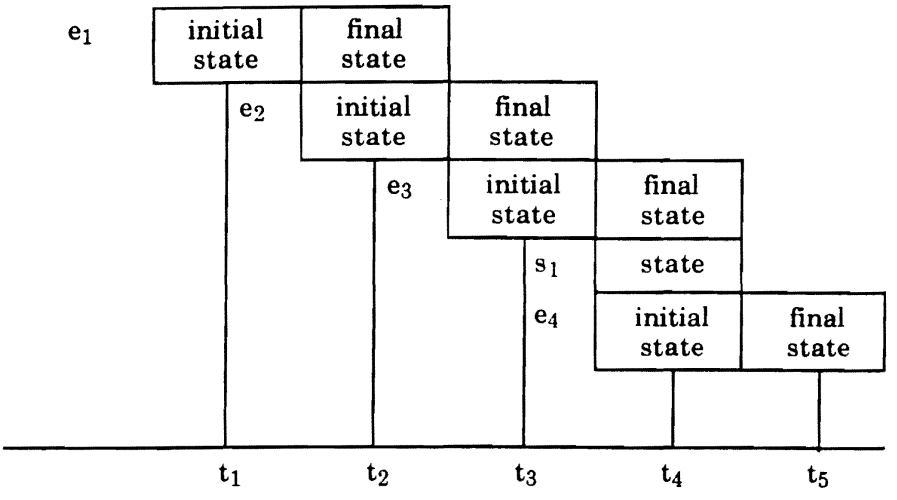
(10) John got up, went to the window, and raised the blind. It
$e_1$ $e_2$ $e_3$

was light out. He pulled the blind down.
$s_1$ $e_4$

In (10), the final state of each events overlaps with the initial state of the following events and the $s_1$ overlaps both the final state of $e_3$ and the initial state of $e_4$. See diagram 1. In diagram 1, as well as in the other diagrams in this paper, we omit states of change for the convenience of explanation.

As is discussed in Reichenbach (1947), the reference time of a non-perfect sentence is equal to the event time of it. Thus, the reference time of an event-describing sentence in the simple past tense must be an interval including every point/interval of time at which the states in that event obtain. For example, in diagram 1 the reference time of $e_1$ is an interval including $t_1$ and $t_2$ and that of $e_2$ is an interval including $t_2$ and $t_3$, and so on.

Diagram 1




We assume that events cannot overlap directly with other events or states but states in those events can overlap with other states. We think that when a new state is introduced into a discourse, it overlaps with the latest state and when an event is introduced into a discourse, the initial state of that event overlaps with the latest state.

In (10), the events and the state are understood to be happening in succession. However, while the events of the first sentence in (11) below are understood to be in a temporal sequence, the states of the remaining sentences are interpreted as obtaining at the same time the events in the first sentence of (11) occurs:

(11) He went to the window and pulled aside the soft drapes. It was a
$e_1$ $e_2$ $s_1$

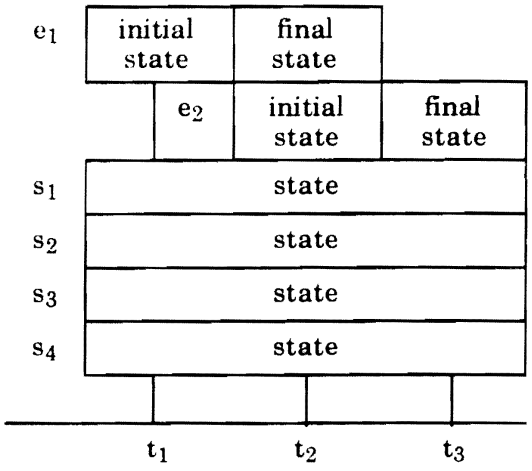
casement window and both panels were cranked out to let in the night
$s_2$

air. The apartment was on the second floor. The window itself
$s_3$

was a scant five feet above the roof.
$s_4$

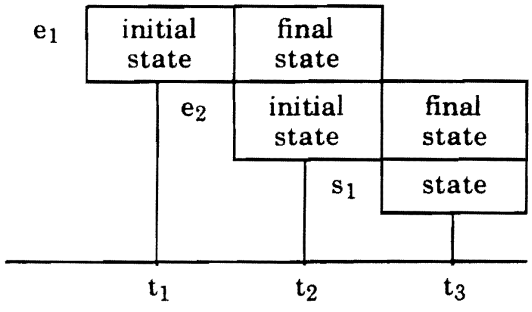
In (11), movement of the reference time can be represented as in diagram 2. We think that even in this case, the introduction of states in the discourse is in basically the same way as in diagram 1. This means that when a state is introduced in discourse, it overlaps with the latest state in that discourse.

Diagram 2




When $s_1$ is introduced in (11), the temporal structure of discourse can be represented as in diagram 2'.

Diagram 2'




After that, $s_1$ spreads backward and overlaps with the previously introduced states. We call this phenomena backward-spreading (BS) and stipulate the conditions for BS as in (12) below:

(12) Backward-Spreading (BS)
   a. A state may spread and overlap with previously introduced states, if it is compatible with those states.
   b. Whether the said state is compatible with other states or not is decided in terms of real world knowledge and the internal structure of events.

We think that we cannot stipulate exactly what state should overlap with another state without concerning real-world knowledge. But after we find out what state is overlapping with other states, we can infer how reference time moves in a discourse. We claim that the temporal structure of a discourse is mentally represented as in diagram 1 or diagram 2.

Let us turn now to (13) below:

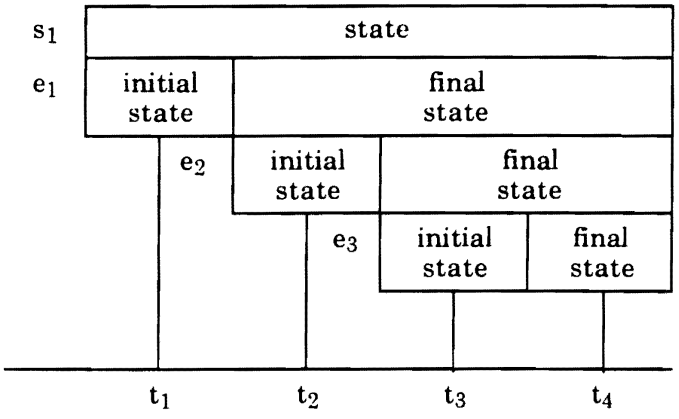
(13) Jaime was building another boat. He sang happily as he worked,
$s_1$ $e_1$

the muscles of his brown arms rippled in the sun, and crispy wood
$e_2$

shavings made a carpet between his bare feet and the sand.
$e_3$

The temporal structure of (13) can be represented as in diagram 3.

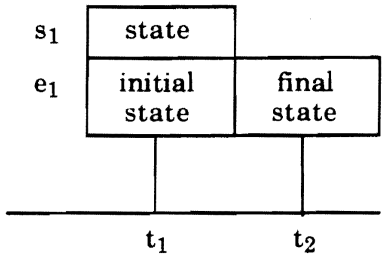
Diagram 3




Hinrichs (1986) claims that the events and states in (13) overlap each other and obtain/occur at the same time. However, we think that the initial states of $e_1$, $e_2$ and $e_3$ do not overlap each other and they are temporally ordered as in diagram 3. This means that even in (13), the reference time moves.

We think that in this case too, the introduction of states in the discourse is basically the same as in diagram 1 or 2. When $e_1$ is introduced in (13), the temporal structure of discourse can be represented as in diagram 3'.

Diagram 3'




After that, s1 spreads forward and overlaps with both the initial and final state of e1. The same processes take place when e2, e3 and e4 are introduced in the discourse.

We generalize this kind of spreading of states and BS as state spreading (SS). We stipulate the conditions for SS as (14) below:

(14) State Spreading
   a. A state may spread and overlap with other states in discourse, if it is compatible with those states.
   b. Whether the said state is compatible with other states or not is decided in terms of real world knowledge and the internal structure of events.

## 4.0 CONCLUSION

In this paper, we have attempted to explain how reference time moves in discourse and why event-describing sentences and state-describing sentences show different behavior with respect to the movement of reference time in discourse. Our claim is that the movement of reference time can be explained by clarifying the overlap relations between states. The difference between events and states can be characterized by assuming events as gestalt which consists of various states, each state needing to obtain at a different point / interval of time.

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# SOME PATTERNS OF *WA* IN NXA?AMXCIN (MOSES-COLUMBIA SALISH)[1]

**Marie Louise Willett**

Department of Linguistics
University of Victoria

## 1.0 INTRODUCTION

Nxa?amxcín (Moses-Columbian) is a Southern Interior Salish language spoken in central Washington State. There has been relatively little research devoted to the syntax of the language, especially from any theoretical perspective. The purpose of the paper is to provide an analysis of **wa**, a particle surfacing very frequently in collected data[2]. Czaykowska-Higgins (to appear) has suggested that **wa** is linked to the absolutive argument. This paper supports this suggestion by illustrating that **wa** optionally surfaces with subjects in intransitive constructions and objects in transitive constructions, demonstrating an absolutive pattern. I suggest an analysis of **wa** that accounts for its appearance in both simple and cleft constructions. I propose that **wa** is an absolutive particle that optionally surfaces when a maximal projection has an absolutive case feature. This maximal projection can be an NP that has been directly assigned absolutive case, or a CP which has an absolutive case feature as a result of Spec-head agreement between the specifier of CP and the head C. The paper is organized as follows. I first discuss some properties of Nxa?amxcín that are directly relevant to the discussion in this paper (section 2). I then examine simple clauses and the **wa** pattern in these constructions (section 3). Cleft constructions are then analyzed following current analyses within the Salish literature (section 4).

## 2.0 SOME PROPERTIES OF THE LANGUAGE

While post-predicate word order appears to be free in Nxa?amxcín, basic word order is VOS, as in (1)[3]:

| | | | | | |
|---|---|---|---|---|---|
| (1) | ɬéq$^{w}$s | wa | ttẃít | ?aní | kiḥána? |
| | √ɬəq$^{w}$-t-s-ø | | | | |
| | slap-(TR)-3S-(3O) | WA | boy | DET | girl |
| | 'The girl slapped the boy.' | | | | (ECH: 91.121) |

Like other members of the Salish family, Nxa?amxcín is a pro-drop language exhibiting both null subjects and objects. Both person and number of the subject and object are determined by the morphology on the predicate in transitive constructions:[4]

(2) ?ámtən
√?əm-t-n-ø
feed-TR-1sS-(3O)
'I feed him/her.' (ECH: 90: (N) 204)

In intransitive constructions the morphology indicating the person and number of null subjects is not realized on the predicate, but rather as a clitic[5]:

| | | |
|---|---|---|
| (3) | ċəlút | kən |
| | stand | 1sS |
| | 'I stood up.' | (MDK: W.4.9.167) |

Finally, it is important to note that the morphological paradigm for person agreement is suggestive of a split case system in the language. 1st and 2nd person follow a nominative/accusative-type

system, whereas 3rd person exhibits an ergative/absolutive pattern. Whether or not Nxa?amxcín is syntactically a split-ergative language remains to be seen. The analysis of the particle **wa** in this paper is the first source of evidence for an ergative-type system, at least with respect to 3rd person.

## 3.0 SIMPLE CLAUSES

I use the term "simple clause" to refer to constructions where there is no marked "fronting" of constituents.[6] Thus, simple clauses consist of VS, VOS or VSO word order. The following subsections discuss the appearance of **wa** in both intransitive and transitive simple clauses. (The absolutive argument has been underlined in the examples throughout this paper.)

### 3.0.1 Intransitive

The following intransitive constructions demonstrate that **wa** surfaces to the left of intransitive subjects:

(4) tqənúxʷ **wa** sqʷəsqʷésaʔs
tqənúxʷ-ø sqʷəsqʷəsaʔ-s
hungry 3S WA baby-3POSS
'Her baby got hungry.' (AB.4.7)

(5) xʷáy̓əm **wa** ʔinxxəx̌cín
√xʷay̓-m-ø ʔin-x̣x̣əx̌cin
run away-INTR-3S WA 1POSS-dog
My dog ran away. (AB.4.10)

(4) contains an adjectival predicate and (5) an intransitive verb with an overt nominal subject marked by **wa**. Thus, as (4) and (5) demonstrate, in intransitive constructions **wa** surfaces to the left of the subject NP.[7]

### 3.0.2 Transitive

The following transitive constructions show that **wa** surfaces to the left of the transitive object:

(6) t̓éqʷs **wa** ttw̓it ʔaní kiḥána?
√t̓əqʷ-t-s-ø
slap-(TR)-3S-(3O) WA boy DET girl
'The girl slapped the boy.' (ECH: 91.121)

(7) t̓ám̓s **wa** John ł hacmíntns pro
√t̓əm̓-t-s-ø hacmintn-s
cut-(TR)-3S-(3O) WA John POSS rope-3POSS 3S
'He cut John's rope.' (ECH: 92.78)

Example (6) contains two overt nominals and **wa** surfaces to the left of the object NP. (7) has a null subject represented by the null element "pro". Again **wa** surfaces to the left of the object NP. (7) shows that **wa** does not just mark the head as it surfaces outside of both the possessed NP and the possessor.

At this point it seems clear that the particle **wa** is linked to the absolutive argument. Considering that there is only one absolutive argument per clause, we would expect only one **wa** particle to surface per clause. Example (8) shows that this is the case:

(8) * kxáps **wa** púS **wa** xxəɬcín
chase-(TR)-3S-(3O) WA cat WA dog (ECH: 92.27)

In (8) the double appearance of the particle **wa** results in an ungrammatical structure.

3.1 Optionality

The particle **wa** is optional in that it is not required to co-occur with an absolutive argument. This is shown in (9) for intransitive constructions and (10) for transitive constructions:

(9) tqənúx$^{w}$ sq$^{w}$əsq$^{w}$ésaʔs
sq$^{w}$əsq$^{w}$əsaʔ-s
hungry baby-3POSS
'Her baby got hungry.' (ECH: 91.101)

(10) máɬ$^{w}$s nlx$^{w}$átk$^{w}$tn smʔáməm
√máɬ$^{w}$-t-s-ø
break-(TR)-3S-(3O) pot woman
'The woman broke the pot.' (AB.1.19)

**wa** is not required to appear with the intransitive subject in (9), nor with the transitive object in (10).

3.2 Marks Absolutive NP

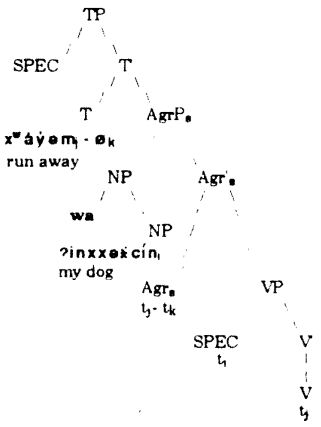
Having established that **wa** co-occurs with absolutive arguments, it is now necessary to address how this structure can be represented. I suggest that **wa** optionally marks a maximal projection when that maximal projection has an absolutive case feature. In the examples provided thus far, it is clear that this maximal projection can be an NP that is assigned absolutive case.

Following Chomsky (1991, 1993) I assume that case is assigned by the head of a functional projection to its specifier position. Given that transitive subjects are marked by one morpheme and intransitive subjects by another with respect to 3rd person morphology, I assume it is the head $Agr_s$ that assigns absolutive case and the head $Agr_o$ that assigns ergative case in 3rd person constructions in Nxaʔamxcín.[8] This results in a "nested paths"-type movement (to be illustrated in (13)) that places the object in a higher position in a tree than the subject, a view supported for various other languages by Campana (1992), Jelinek (1993), Johns (1992) and Murasugi (1992). In Nxaʔamxcín, when a head $Agr_s$ assigns absolutive case to an NP in its specifier position, that NP can be optionally marked by the **wa** particle. We can schematize this as follows:

(11) NP [+ absolutive] → (**wa**) NP

This is illustrated in the following tree for the intransitive construction in (5):

(12)

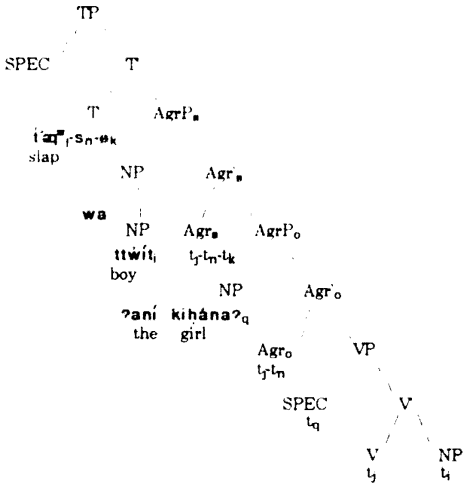



I am assuming that Nxaʔamxcín generates the functional projection TP (Tense Phrase) following Chomsky (1991, 1993) and Pollock (1989) on English and French. I further assume that the specifier of $AgrP_s$ is a case-marked position: in (12) the head $Agr_s$ will assign absolutive case to the argument that raises to its specifier.

In (12) the predicate **x$^w$áẏəm** 'run away' raises from its base-generated position under V to the head $Agr_s$. The predicate then raises to T where it is marked for the feature [+ tense]. The sole argument of the clause, **ʔinxẋəẋcín** 'my dog', is the intransitive subject (or the absolutive). It is base-generated in SPEC of VP and then raises to the specifier of $AgrP_s$ position where it is assigned absolutive case by the head $Agr_s$. When this NP is licensed, **wa** surfaces to mark the noun phrase with the absolutive case feature. I represent **wa** in an adjoined structure.

A transitive construction like (6) is shown below:

(13)




The predicate **təq$^w$** 'slap' raises to each of the Agr head positions where it is marked for subject and object agreement respectively. It then raises to the head T(ense) where it is marked with the [+ tense] feature. The ergative argument **ʔaní kiḥánaʔ** 'the girl' raises to the specifier position of $AgrP_o$ where it is assigned ergative case by the head $Agr_o$. The absolutive argument **ttẇít** 'boy' raises to the specifier position of $AgrP_s$ where it is assigned absolutive case by the head $Agr_s$. When this NP is assigned the absolutive case feature, the particle **wa** surfaces to overtly mark it as absolutive. As before, I represent this particle in an adjoined structure.

At this point we have determined that **wa** marks a maximal projection NP that has been assigned absolutive case. In the following section I suggest that the appearance of **wa** is not restricted to absolutive NPs, but rather to any maximal projection that has an absolutive case feature.

## 4.0 CLEFT CONSTRUCTIONS

Cleft constructions in Nxaʔamxcín contain a preposed argument followed by the particle **ɬuʔ**. Such constructions may contain a clefted nominal or wh-element. We have seen thus far that when the particle **wa** appears in a clause, it consistently surfaces to the left of an absolutive argument. We see in the following sections that, at least on the surface, **wa** in cleft constructions demonstrates a different pattern.

### 4.0.1 Clefted Ergatives

The following examples illustrate that in clauses where there is a clefted ergative element, the positioning of **wa** is the same as in simple clauses:

(14) **Jóhn ɬuʔ céks wa Máry**
√cək-t-s-ø
John PART hit-(TR)-3S-(3O) WA Mary
'It was John who hit Mary.' (ECH: 92.240)

(15) **sɬaʔcínəm ɬuʔ ʔaẇtáps wa ttẇít**
√ʔaẇt=ap-t-s-ø
deer PART follow=foot-TR-3S-(3O) WA boy
'The deer followed the boy.' (AB.4.16)

In (14) the ergative argument **John** is clefted in initial position followed by the particle **ɬuʔ**. The absolutive argument **Mary** appears in a non-clefted position following the predicate and, as we would expect, **wa** appears to the left of it as in the simple clauses. (15) demonstrates the same pattern.

### 4.0.2 Clefted Absolutives

The following examples containing clefted absolutive arguments have the particle surfacing in an apparently alternative position:

(16) **sɬaʔcínəm ɬuʔ wa ʔaẇtáps tẇít**
√ʔaẇt=ap-t-s-ø
deer PART WA follow=foot-(TR)-3S-(3O) boy
'It was the deer that the boy followed.' (AB.2.4)

(17) **stám̓ ɬuʔ wa cḥaẇistús**
c-√ḥaẇi-stu-s-ø
what PART WA STAT-make-CAUS-3S-(3O)
'What is he making?' (AB.2.17)

Examples (16) and (17) demonstrate a clefted absolutive nominal and wh-element respectively, followed by the particle **ɬuʔ**. In these examples, **wa** is surfacing to the right (not left) of the absolutive element and the particle **ɬuʔ**. In fact, it is not possible for **wa** to surface to the left of a clefted absolutive (unlike what is found in simple clauses), as shown in (18):

(18) ***wa Chúck ɬuʔ qiy̓xíc**
WA Chuck PART write-IND-TR-3S-(3O) (ECH: 91.52)
('It was Chuck that someone wrote to.')

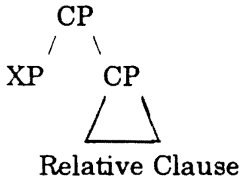
The above example demonstrates that **wa** cannot precede an absolutive when it is the clefted element in a clause.

The question that presently needs to be addressed is why the particle is surfacing to the left of absolutives in a non-clefted position and to the right of absolutives in a clefted position. The following section proposes that **wa** patterns in both cases in parallel: in both instances, **wa** is surfacing to the left of a maximal projection that has an absolutive case feature.

## 4.1 NOMINAL PREDICATES

Before examining the appearance of **wa** in cleft examples, it is necessary to address what the underlying structure of these constructions actually is. It has been generally assumed that cleft constructions are comprised of a nominal predicate followed by a relative clause (Gardiner 1993, Gerdts 1988, Hukari 1994, Kroeber 1991). This type of construction can be illustrated as in (19)[9]:

(19)




In (19) XP is an open category that contains a predicate which may be in the form of a noun phrase, a prepositional phrase or an adjectival phrase. (We are only concerned with nominal predicates in this paper.)

Similar cleft constructions in Shuswap clearly show that what follows the nominal predicate is a relative clause since it is morphologically marked as a relative clause. In Nxa?amxcín, relative clauses are introduced by the morpheme **t**, which is also the oblique marker. This morpheme is optional in relative clauses. Regarding cleft constructions, almost none of the ones in the data available to me contain the **t** morpheme. However, I have checked the cleft examples in this paper with a native speaker and it is clear that **t** can optionally surface in these constructions, as shown below:

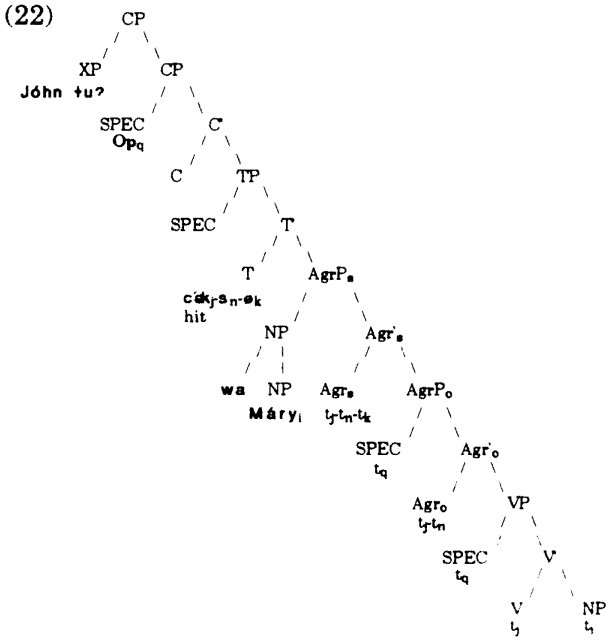
(20) Jóhn ɬu? (t) cáks **wa** Máry
√cək-t-s-ø
John PART (OBL) hit-TR-3S-(3O) WA Mary
'It was John who hit Mary.' (AB.5.1)

(21) sx̣acínəm ɬu? **wa** (t) ʔawt̓áps ttw̓ít
√ʔaw̓t=ap-t-s-ø
deer PART WA (OBL) follow=foot-TR-3S-(3O) boy
'It was the deer that the boy followed.' (AB.5.6)

While the cleft examples in this paper do not give any overt morphological indication that what follows the nominal predicate is a relative clause, I assume based on (20) and (21) that a relative clause is present, as in Shuswap.

Kroeber (1991) has noted that Salish languages do not have any overt form corresponding to a relative pronoun. Following Gardiner (1993), I assume that instead of an overt relative pronoun there is an empty operator which is marked for the [+ wh ] feature like relative pronouns in English. Thus, in Nxa?amxcín cleft constructions there is empty operator movement taking place. I represent this in (22) for example (14):

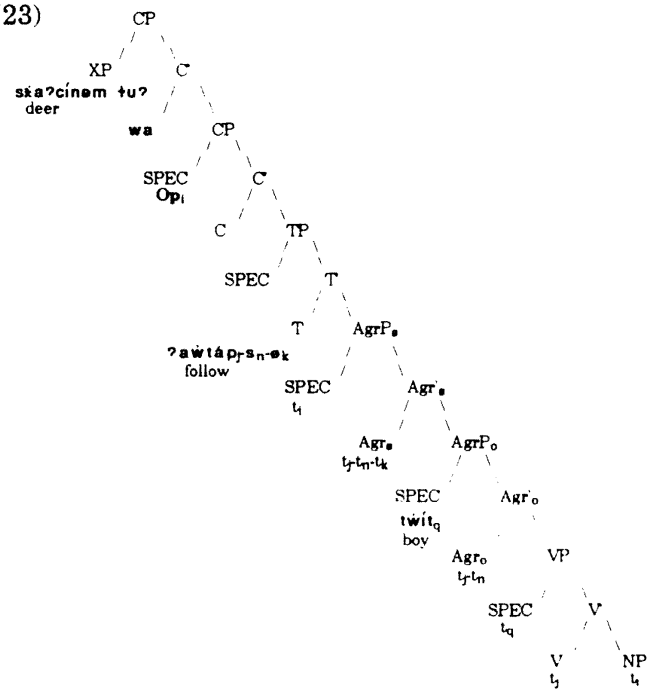
(22)




In the tree in (22), the NP **John** is the predicate of the clause. It is modified by a relative clause, the lower CP. Within the relative clause, the ergative argument is the empty operator **Op**. This operator raises to SPEC of CP where it binds the variable $t_q$ in the SPEC of $AgrP_o$ (which itself binds a trace in the SPEC of VP). This variable is assigned ergative case by the head $Agr_o$ in the specifier position of $AgrP_o$. The relative clause predicate **cək**, base-generated under V, raises to the head T passing through $Agr_o$ and $Agr_s$ and acquiring the necessary morphological agreement. The absolutive argument **Mary** is base-generated in the V-complement position and raises to SPEC of $AgrP_s$ where it is assigned absolutive case by $Agr_s$. When the maximal projection NP has an absolutive case feature, the particle **wa** surfaces to mark that NP. Note that although the nominal **John** syntactically has a predicative role, semantically it represents the empty operator.

The syntactic account of the appearance of **wa** in the cleft construction in (22) is parallel to that given for **wa** in the simple clause in (13). If we now consider an example like (16) where the empty operator has an absolutive role, we see that **wa** can not only mark a maximal projection NP but also a CP. Example (16) is illustrated in (23):

(23)




In (23), the nominal **sx̌a?cínəm** 'deer' is the predicate of the clause as a whole. It is followed by a modifying relative clause headed by CP. Within this relative clause, the ergative argument is base-generated under SPEC of VP and raises to SPEC of $AgrP_o$ where it is assigned ergative case by the head $Agr_o$. The verb raises from the head V to the head T, passing through $Agr_s$ and $Agr_o$ where it acquires the necessary agreement morphology. The absolutive argument, an empty operator, is base-generated in the V-complement position and raises to the specifier of CP position, passing through SPEC of $AgrP_s$. The operator binds a variable $t_i$ which is assigned absolutive case by the head $Agr_s$. As shown in (23), **wa** surfaces to the left of the empty operator.

There are two possible assumptions we could make concerning the appearance of **wa** in this position. The first is that we have a parallel situation to (22) where **wa** is surfacing next to an NP that has been assigned absolutive case, this NP being the empty operator. However, if **wa** can mark a null element like an empty operator, one would expect it to surface with other absolutive null elements like null subjects and objects. I have seen no evidence to indicate that **wa** can mark a "pro" element in a clause. Thus, an alternative analysis might be more appealing.

A second possible assumption is that **wa** is not marking the NP containing the empty operator, but rather marks the maximal projection dominating that NP. This maximal projection is CP. In the tree in (23), the CP heading the relative clause is not directly being assigned absolutive case. Therefore, **wa** must be surfacing adjacent to CP for another reason. I suggest that in Nxa?amxcín, Spec-head agreement between the specifier of CP and the head C (i.e. COMP agreement) is obligatory and that **wa** surfaces as a result of this agreement.[10] In the following sections, I discuss the details of COMP agreement in general and how it applies to Nxa?amxcín.

4.2 Comp Agreement

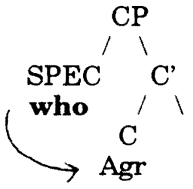
Rizzi (1990) discusses the possibility of Spec-head agreement between the specifier of CP and the head C, noting that "a number of languages show processes of morphological modifications of Comp when a wh-element is moved to its Spec" (p.54). This kind of Comp agreement takes place when the specifier of CP position is filled by a wh-operator (or a trace). The head of the maximal projection dominating that operator is marked for agreement with the operator. This agreement

may either have some overt morphological form or appear covertly as an independent head Agr. In English Comp agreement is covert, as shown in (24):

(24) Who [ t left ]
[Agr]

We can illustrate English Comp agreement as in (25):

(25)




Rizzi states that in order for an example like (24) to be grammatical, the inert head C must be turned into a proper head governor for the trace **t**. This is possible through Spec-head agreement where the head C is assigned the feature Agr as in (25). Even though the Agr feature is present to ensure that C is a proper head governor, in English this Agr feature is not overtly realized.

There are languages where agreement in Comp is overt, and the feature that is morphologically reflected by this agreement appears to be language specific. For example, in Kinande (Bantu) there is evidence of agreement in C as a wh-element in the specifier of CP position triggers agreement in class on the head C (Schneider-Zioga 1987), as exemplified by the data in (26):

(26) Kinande COMP Agreement

| | | | | |
|---|---|---|---|---|
| a. | IyondI | y0 | kambale | alangIra |
| | who (cl.1) | that (cl.1) | Kambale | saw |
| b. | aBahI | Bo | kambale | alangIra |
| | who (cl.2) | that (cl.2) | Kambale | saw |
| c. | EkIhI | ky0 | kambale | alangIra |
| | what (cl.7) | that (cl.7) | Kambale | saw |
| d. | EBIhI | By0 | kambale | alangIra |
| | what (cl.8) | that (cl.8) | Kambale | saw |

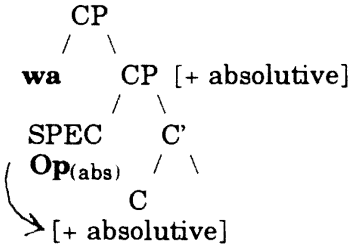
As (26) demonstrates, the complementizer 'that' in Kinande must morphologically agree in class with the wh-element in the specifier position. Thus in Kinande, though not in English, agreement between the specifier of CP and a head C is overtly realized.

### 4.3 Nxaʔamxcín Comp Agreement

Assuming that Comp agreement could also be present in Nxaʔamxcín, we could pursue this route as a possible solution for the position of **wa** in (23). Let's assume that Spec-head agreement is required in Nxaʔamxcín when there is an empty operator in the specifier of CP position. If we consider the tree in (22), it appears that this agreement is not overtly marked in any way when the empty operator is the ergative argument. We see that in (23), however, when the empty operator is the absolutive argument the particle **wa** can surface. I suggest that when Comp agreement takes place in Nxaʔamxcín, the feature of the operator in SPEC of CP that is reflected as agreement in the head C is case. We have seen that ergative case does not trigger any special particle in Nxaʔamxcín, however absolutive case does. Thus, when Comp agreement takes place with an ergative operator, there is no overt agreement. However, when Comp agreement takes place with an absolutive operator, the **wa** particle can optionally surface to reflect this agreement. Since **wa** otherwise appears marking maximal projections with an absolutive case feature, I assume that in (23) **wa** is marking the maximal projection CP.

If agreement is taking place between the specifier of CP and the head C, why is **wa** marking the maximal projection CP as absolutive? In other words, how is CP acquiring the feature [+ absolutive]? This feature is present in CP via feature percolation from the head C to its maximal projection. Thus, what is a feature of the head is a feature of the maximal projection as a whole. This is schematized in (27):

(27)




If we assume that when a maximal projection has an absolutive case feature it may be optionally marked by the particle **wa**, then (27) represents an environment where it should be possible for **wa** to surface.

Given the possibility that the particle **wa** can mark a maximal projection CP, we should now revise the statement in (11) that **wa** surfaces with NPs with an absolutive case feature. (11) might now best be represented as (28) (where X is an open category):

(28) XP [+ absolutive] → (**wa**) XP

In summary, in this section we have advanced the claim that **wa** can surface as a result of Spec-head agreement between an empty operator and a head C. This agreement is transferred to the maximal projection CP through feature percolation resulting in a maximal projection with an absolutive case feature. As a result, **wa** surfaces to mark this maximal projection.

## 5.0 CONCLUSION

This paper has attempted to define a rule that will predict the pattern for the particle **wa** in Nxaʔamxcín. It appears that **wa** marks an argument that has been assigned absolutive case. If we make this assumption, then we can only structurally define the appearance of **wa** in simple clauses and in cleft constructions where the empty operator is not the absolutive. In order to account for all appearances of **wa** in both simple and cleft forms we must link this particle to any maximal projection that has an absolutive case feature. Thus, we find that **wa** not only marks absolutive NPs, but also CPs marked for absolutive case as a direct result of Spec-head agreement.

## NOTES

1. I would like to thank my Nxaʔamxcín teacher Mrs. Agatha Bart. This work has greatly benefitted from comments by Leslie Saxon and Tom Hukari. In addition, Ewa Czaykowska-Higgins has provided me with much productive discussion on the Nxaʔamxcín language in general. I am grateful to both E. Czaykowska-Higgins and M. D. Kinkade for allowing me access to their files on Nxaʔamxcín. This research has been supported by a Social Sciences and Humanities Research Council of Canada (SSHRC) Doctoral Fellowship and by SSHRC Research Grant #410-92-1587 to E. Czaykowska-Higgins.

2. The data in this paper come from three sources: E. Czaykowska-Higgins' files (ECH), M. D. Kinkade's files (MDK), and my own field notes (AB). The morpheme glosses provided for all examples are my own.

3. The abbreviations used throughout this paper are as follows: CAUS = causative, DET = determiner, IND = indirective, INTR = intransitive, O = object, OBL = oblique, PART = particle, POSS = possessive, s = singular, S = subject, STAT = stative, TR = transitive.

4. The translations are taken directly from the source. All null subjects and objects translated as either 'he' or 'she' should be interpreted as 's/he'.

5. Third person intransitive morphology is zero.

6. I borrow the term "fronting" from Kroeber (1991).

7. It is of interest to note that intransitive subjects must be marked for possession in order for **wa** to surface. Why such a requirement is in place is unclear at this point.

8. This assumption is, of course, tentative pending further evidence that an ergative system is present in the language.

9. Gardiner (1993) assumes the same structure.

10. I would like to thank T. Hukari and L. Saxon for discussion leading to this conclusion.

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# THE YIN AND YANG ASPECTS OF LANGUAGE

**Yang Wei**

Department of Linguistics
University of Victoria

## 1.0 INTRODUCTION

Much like the studies on language birth -- the processes of pidginization and creolization (see Foley 1988) -- more and more studies have been dedicated to the phenomenon of language death (e.g., Dressler 1988). Language death occurs in unstable bilingual or multilingual speech communities as a result of language shift from a regressive minority language to a dominant majority language. Some languages are "dead" as a result of having been transformed into daughter languages (Dressler (1988) gives an example of standard Latin being replaced by standard Spanish), leaving the dead written form with no speakers. Other languages die when the the entire speech community dies, as in the case of the Californian language Yaki (see Swadesh, 1948). Still other languages (e.g., Lushootseed) are "dying" partially due to the lack of an effective means to record and widely spread their use, and linguists are trying to "rescue" these languages by providing them with a proper written system in the hope that such a system will make it easier for these languages to be learned or acquired as "healthy" languages. If a language can be dead or dying, questions arise: What are the essential components of a healthy language? From the experience of such languages as Latin and Lushootseed (though some may not consider them appropriate examples), can we say that the co-existence of both spoken and written systems of a language forms the basic life structure of a given language? What is the principal mechanism that keeps a language healthy? These questions may not find ready answers in today's mainstream theoretical linguistics, but the key to these questions can be found in an oriental philosophy of the *Taoist* yin-yang theory.

The Chinese *Taoism* structures the universe out of ever-changing yin and yang energies, the balance or harmony of which is "the way" (*Tao*) to develop all natural existence, including language. Modern linguistic theories seem to have "sliced" language into tiny pieces such as phonemes, moras, tonemes, features, etc. There are sub-disciplinary boundaries between linguistic branches such as syntax, phonology, semantics, in which different aspects of language are studied from a separate angle. From a Taoist point of view, language is an inseparable harmonious whole. It has followed its own basic law to develop into what it is now. No matter what sub-disciplines the study of language is divided into, linguists are dealing with one thing: the relationship between two categories -- *yin* and *yang*. This seeming disregard for sub-disciplinary boundaries reflects the unitary and integrative vision of Taoism, whose strong undercurrent of oneness is so pervasive in many oriental cultures (Givon 1989).

This paper looks at the nature of language structure from a Taoist point of view, showing that language as a natural existence is composed of unifying yin and yang elements, the due proportion of which assures the well-formedness, or the "healthiness", of a given language. All aspects of language involve the interdependence, mutual control, and mutual transformation of yin and yang in the language. The constant interaction between yin and yang aims to keep the balance and the "harmonious whole" of the language structure and its grammatical functions. Language disorders occur once such yin-yang balance is lost.

## 2.0 THE BASIC PRINCIPLE OF THE YIN-YANG THEORY

*Yin* and *Yang* are originally separate concepts representing "exposed to the sun" (yang) and "facing the opposite direction of the sun" (yin). Later on, these two terms were extended to stand for the opposite two sides of an object or an event. The major symbolic representation of the Taoist doctrine of complementarity of opposites is the emblem of the Supreme Ultimate (*Tai Ji*), made from yin and yang (see Fig. 1. below). *Yang* corresponds to:

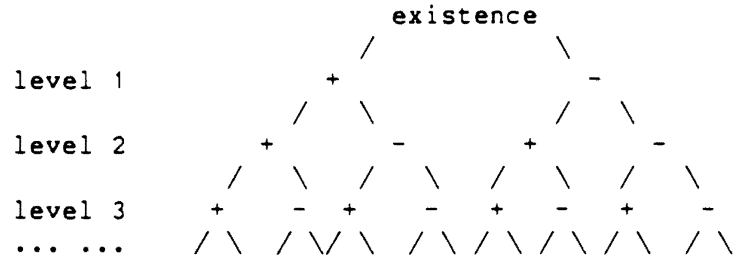
> heaven, light, fire, life, masculinity, movement,
> and anything that is bright, warm, light, invisible, strong,
> dynamic, going out/up, active or positive

while *Yin* corresponds to:

> earth, darkness, water, death, femininity, stillness,
> and anything that is dark, cold, heavy, restricted, waning,
> static, going in/down, passive, or negative

There are four major principles within the yin-yang theory: opposition, interdependence, mutual complementarity, and mutual transformation. *Opposition* suggests the polarity within any complete entity. Unlike post-Socratic Western epistemology, which is founded upon categories that are discrete and mutually exclusive, the Taoist approach to categories recognizes the relativity of binary distinctions, the fact that they are polar only within a limited context (Givon 1989). As Lao Tzu pointed out in his *Tao Teh King* (see Bahm 1980), all distinctions naturally appear as opposites. Each member of a pair of opposites gets its meaning from the other and finds its completion only through the other. The dark and the light reflect each other, the hard and the soft explain each other, the long and the short reveal each other, the high and the low define each other (Givon 1989). The relationship between the two opposites shows the nature of yin-yang *interdependence*, indicating that yin and yang contain each other, and one is not complete or cannot survive without the other. Furthermore, the opposites do not remain in a fixed state; they are *mutually complementary* and are constantly waxing and waning. As explained in *Tao Teh King* (see Bahm 1980), what shrinks must first be large, what falls must first be high. Some things go fast while others lag, some things grow strong while others wilt. When day goes further, it becomes night, and when night goes further it becomes day. Therefore, the opposites *transform* into each other under certain conditions. These examples illustrate the simple materialistic Taoist world outlook, which has given theoretic guidance to philosophy, religion, education, sociology, medicine, and many other fields. In general, yin and yang are the basic features of all phenomena, and they exist at different levels in the structure of a natural existence (see Fig. 2.).

(FIG. 1)




(FIG. 2)

Taoism advocates that yin and yang are the laws of all beings. According to *Huang-Di Nei-Jing*, a classical work on traditional Chinese medical theories based on the yin-yang philosophy (written about 2000 years ago), "to follow (the laws of yin and yang) means life; to act contrary to (the laws of yin and yang) means death. To follow these (laws) results in order; to act contrary to them results in chaos" (Unschuld 1988: 13). To treat a human being's physical disorder, the principle practice of traditional Chinese medicine is to balance and regularize the yin and yang of the patient's internal structure. To save a language, or to maintain the normal functions of a language, linguists should be aware of the yin and yang aspects of the language structure before prescribing effective methods. The application of yin-yang theory in language studies is relatively novel, but it does seem to explain why a language can be dead or dying, since "death" in this theory is defined as separation of yin and yang. Language is a unity of activity and passivity, thought and feeling, spiritual timelessness and material temporality, individuality and society (Bailey 1982). The Taoist yin-yang concept provides a unifying relation that prevents these oppositions from being antagonistic and truncated, making them complementary and mutually fulfilling. A better understanding of the yin and yang aspects of language may help understand why languages can be "healthy" and "dead", and what linguists can do to promote language continuity.

## 3.0 THE YIN AND YANG ASPECTS IN LANGUAGE

Modern linguistics has segmented language into many units and has classified these units into different categories. A yin-yang theorist looks at language in just two basic bipolar categories at each level of the language structure. The yin and yang concept are similar to, but significantly different from, the traditional oppositions of matter vs. mind, concreteness vs. abstractness, mechanism vs. organism, etc. They are similar in that they both emphasize the polarity or the binary features of "things", which are based on a static philosophy. They are different in that the yin and yang philosophy also believes in the dynamic and processual relations between the polarities. Traditional oppositions have lead linguists to attempt developmental and comparative analyses of language with models that are explicitly "synchronic" and "idiolectal" (see Bailey 1982). These developmental and comparative approaches were in a way predicted long ago by the yin-yang theory. If language is considered as a multi-level structure both in form and its communicational functions, the yin-yang balance can be seen at each level and at each communicational aspect.

### 3.1 Yin and Yang in Language Structure

Language is a yin-yang balanced hierarchical structure with different elements at different levels (e.g., phonemes, syllables, words, sentences, discourse). Sentences in a language (e.g., English) are divided into positive (a yang feature) sentences (1a) and negative (yin) ones (1b). A positive sentence can again be subdivided into active (yang) sentences (2a) and passive (yin) ones (2b).

(1) a John loves Mary.
    b John does not love Mary.

(2) a John is watching.
    b John is watched.

Positive and active sentences are dominant in a language in that they are more productive, easier to comprehend, and hence more frequently used than negative and passive ones. These two classes of sentences show not only the opposition of language structure at sentence level, but also the

interdependence of the two opposites. Without either of the sentence forms, the feeling of John toward Mary in (1) cannot be precisely conveyed (with the lexical items provided in the sentence), and the relation between John and the act of "watch" in (2a) and (b) will not be distinguished. It is the coexistence of these two (yin and yang) classes of sentences that makes it possible for different meanings to be expressed through sentences in communication.

Similarly, linguistic units at word level also demonstrate the yin and yang aspects. Apart from the fact that word gender plays a role in many languages such as French (e.g., *le ciel* 'the sky' (masculine), *la terre* 'the earth' (feminine)), lexical items in general fall into an open class (dominant, actively changing, hence of the yang nature) and a closed class (subdominant, relatively stable, hence of the yin nature), the due proportion of which assures the well-formedness of sentences in a given language. One cannot imagine a language without content words or morphemes, and sentences without function words would also be incomprehensible. Also, bipolarity is an important character of the semantic features of a word. The unmarkedness and markedness seem to suggest more of the yin-yang opposition and interdependence throughout the semantic domain of a balanced human lexicon. Although the unmarked member of a word pair is considered to be "usual" and "normal", and is therefore more often used, words such as *far* or *deep* cannot be very meaningful without their marked counterparts (*near* or *shallow* in this case) in comparison.

One level further down, we see that a syllable, the basic sound unit of a word, varies between stressed and non-stressed, toned and non-toned, strong and weak, long and short, etc. It is these different features of a syllable and their interactions that make up the complete concept of "syllable". Note that a typical syllable is formed from a consonant and a vowel. It is the different combinations of vowels and consonants that produce the prosodic melody of human speech. Therefore, the contrast between vowels and consonants seems to make the two a pair of unifying opposites since no natural language consists of only vowels but no consonants, or vice versa. Unlike other contrasted features in a language (e.g., positive/negative, active/passive, open/closed, etc.) which can easily match up with the yin and yang feature description in the Taoist polarity philosophy, consonants and vowels pose the question as to whether one is more dominant or active (hence of the yang nature) than the other. The emphasis of this discussion is on the contrast and the interrelationship between two opposites, and a yin/yang definition at this point is neither important nor necessary, but some simple language facts do provide an answer. Consonants are greater in number than vowels in most (if not all) known languages and more variant across languages. They are more expressive and carry more of the phonetic characteristics of a give language. Therefore, it is the consonants that decide the phonetic shape of a given language. Vowels, on the other hand, are relatively stable, and they form a minor part of the phonetic inventory in languages. A striking contrast between consonants and vowels in terms of their activeness and expressiveness is also found in a telegraphic writing system. For example, a sentence like *"Thanks for your message"* can never be shortened to only a combination of vowels such as *"a o ou eae"*, but the group of consonants in the same sentence may convey exactly the same meaning without vowels, such as *"thnks fr yr mssg"*, which can be clearly understood. Despite the clear contrast, vowels and consonants are inseparable. In languages such as Bella Coola, there are words or one-word sentences that contain only consonants but no vowels (e.g., *sp'* 'hit'; *qsx* 'rope'; etc.), but these utterances cannot be longer than one morpheme, or vowels have to be inserted (e.g., *sp'ɨs* 'he hit him'; *ɬiqsxts* 'the rope'). Likewise, insertion of consonants between vowels is also required in cases such as *an eye* in English, and *mon amie* 'my girl friend' in French, as well as the glottal stop insertion such as *ta ʔai ʔanjing* 'he loves quietness' in Chinese.

These language phenomena seem to reflect the basic yin-yang principle: language at any structure level requires contrasting opposite components -- the dominant yang and the subdominant yin. They oppose each other in nature but are interdependent. When yang grows out of its due proportion, it has to be balanced with yin, and vice versa. When certain parts of linguistic systems are lost in a language in the course of simplification, they will be compensated by increased complexity and enrichment in other parts. For example, Old English was simplified by loss of case forms, categories, and finally, almost the entire system of case marking, but in compensation, prepositional constructions flourished, word order became more rigid, and obligatory articles were introduced (Dressler 1988). If structural loss is not compensated, or not balanced, the language decays, becomes partly dysfunctional, and eventually dies. Such a self-regulating system is what the yin-yang theory describes as "harmonization". If this natural law of language is broken, language "unhealthiness" or "death" is the result.

3.2 Yin and Yang in Language Use and Communication

The effect of yin and yang features as a harmonization power occurs in other aspects of language, such as communication. The foregoing vision of wholeness is clearly shown through everyday communication, where we see the two opposite but mutually complementary sides of language functions. Language is all-pervasive in our lives, and its function is that of communication. Basically, this task is carried out by two related but separated activities, the activities of speaking and listening (Kess 1992). Successful, or healthy, communication requires not only the active process of speech production on the side of the speaker, but also the active participation of the listener. In most conversations, the speaker plays the "active" and "dominating" part (the yang feature). The listener, on the other hand, is relatively "passive" (the yin feature), absorbing what the speaker has to say. Therefore, speaking and listening are a pair of unified yin-yang factors that make conversation a harmonious, whole event. A speaker without a listener will not talk normally (even those who talk to themselves have at least themselves as the listener). Of course, the listener in a conversation must signal a not completely passive participation, and provide the speaker with the "auditor back-channel signals" (see Kess 1992). Such signals, however, cannot be sent without the presence of the speaker. The speaker and the listener are mutually interdependent through the principle of turn-taking (wax and wane). When a speaker keeps talking without offering a turn to the listener (the yang is growing out of its due proportion), he or she is breaking the conversational rule and the harmonious whole of the communication process is affected. At this point, it is usually the case that the listener will take the floor (a way to balance the yin and yang in the conversation). The mutual dependence of yin and yang characters in conversation is clearly indicated.

A healthy conversation is one with the yin and yang elements in "due proportion". Too much talking from the speaker with little response from the listener (too much yang with not enough yin) will not keep up the conversation for long (because it is a dull or unhealthy one). If speaker and listener are talking at the same time without following the turn-taking conversation rule (surplus yang with no yin to balance), the conversation is dead. Too much response from the listener to a very quiet speaker (surplus yin and not enough yang) would be unnatural and even pretentious. It would be hard to imagine how a listener would respond to a speaker if the speaker is not speaking at all (lack of yang). Therefore, this "due proportion" of yin and yang in a successful conversation depends on many factors such as the partners' age, gender, education, personality, degree of intimacy between the partners, communication skills, social experience, the content of the conversation, and so forth. The same is true with written communication. When writing, a writer needs to take the reader into consideration in terms of how the writing will affect the read-

er and how the reader will possibly respond. Without the readers in mind, a writer can never write properly. If nothing were ever written by anyone, readers would not exist.

Address pattern in social interaction is another area where the unifying yin and yang features work to keep social relationship harmonious. Address behavior is an important part of communication, which involves such unifying opposites as superior/inferior, distance/intimacy, power/solidarity, nonreciprocal/reciprocal, asymmetry/symmetry, and so forth. Some scholars even suggest the high "Vous" form and the low "Tu" form (Brown & Gilman 1960; Braun 1988, among others) which seem to be a pair of social opposites. All these terms can, in fact, be generalized into just two categories: yin and yang. The way one addresses other people is closely related to how one feels about other people. Society is structured as such a complicated relational system -- from one's boss to one's employees, from one's family members and close friends to those people from whom one wants to keep a certain degree of social distance -- that one has to keep adjusting one's address behavior to always locate oneself properly on the social scale. The V form, being related to the "high" and "dominating" class, is a yang category, and the T form falls into the yin category in the "harmonious whole" of the address system. If only one form exists without the other to balance, the feelings of the addresser to the addressee will not be properly expressed, and the different social relationships and the social and cultural structures of a community will not be differentiated. Such an undifferentiated address pattern is unnatural so long as different classes exist. Also, V and T can transform into each other under certain circumstances. A respected V class addressee can become a close partner of the speaker and be thus addressed with the T form (yang becomes yin); and when the partnership cools off, social distance grows, and the V form may replace the T form between the addresser and the addressee (yin becomes yang). This typically illustrates the inter-transformation process well described in the yin-yang theory.

### 3.3 Yin and Yang in other Linguistic Aspects

The yin and yang features of language can be seen not just in language structures and language communicational functions; they are also pervasive in all other aspects of language, such as language acquisition, cross-language interaction, and the relationship between language and other disciplines.

The two major factors of language acquisition for a child are the innate language capacity of the child and the language input from the environment in which the target language is acquired. Between these two factors, the innate language capacity is the abstract, invisible cognitive ability to actively respond to the language input. The innate language capacity is active and dominant (yang) in the process of language acquisition in that it is variable; it enables the child to acquire whatever language the child is exposed to. In contrast, the speech environment is a constant, and the language input appears in concrete and solid (yin) syntactic and phonological shapes. It is the integration of the two that makes language acquisition possible. Mentally disabled and brain damaged children have great difficulties acquiring language (due to the lack of yang). Feral children, those with poor or no language exposure (lack of yin), do not acquire language as normal children do. These facts illustrate that separation of yin and yang results in an unbalanced, or unhealthy language acquisition process.

Language borrowing between a dominant language and a subdominant language is another area where the yin-yang balance leads to more efficient communication. Languages include words and expressions borrowed from other languages and cultures. This kind of borrowing is of even

greater importance in today's international communication and there is almost no language in which loan words do not exist. Therefore, indigenous and borrowed language items, though opposite in nature, are interdependent. It is their integration that makes the communication functions of a language a harmonious whole. One's native language, being natural and innate, is usually dominant over a second or a foreign language. But this dominance may change (or transform) into subdominance due to social, socio-economic, socio-psychological and political factors. The two unifying opposites (indigenous and borrowed linguistic elements) of a healthy language have to be in a balanced "due proportion". Once this balance is lost, a language may decay or die. There are several causes for such language decay. The first involves massive lexical influx from the dominant language into the recessive language. As Dressler (1988) points out, these loan words tend to be treated as citation words, with little or no phonological and morphological integration, and yet they are still used as normal words of the indigenous language. Without the step of transformation, these loaned words do not enrich the recessive language, but simply replace the indigenous words. Secondly, the borrowing of morphological suffixes makes the synonymous indigenous suffixes become unproductive. Once the grammatical system of a language becomes unproductive, the language becomes unhealthy. More deadly to a language than the two previous factors is word-formation rules ceasing to be productive. The language of technology, culture, etc. has changed from the recessive language to the dominant language, discouraging and gradually stopping the speakers of recessive languages from creating new words by native rules (see Dressler 1988). When the influence of the dominant language becomes stronger and stronger (showing more and more of the yang nature with less and less yin to balance), the harmony is eventually lost, and the recessive language dies.

To extend this discussion a little further, the study of language involves not only the pure linguistic facts, but also other related disciplines, such as psychology, sociology, cognitive science, philosophy, history, and religion. It is the integration of these interrelated studies that makes the study of language an active one. Such interdisciplinary integration, in a broad sense, is well predicted by the yin-yang philosophy. For example, the study of language is an important part of psychology, which, in turn, has been partially combined into linguistic studies in the subdiscipline of psycholinguistics. Whether this study should be called the psychology of language or psycholinguistics really depends on the proportion of the two aspects, which further explains that the "due proportion" of the unifying opposites decides the nature of the whole.

## 4.0 THE YIN-YANG UNBALANCE AND LANGUAGE DISORDERS

As discussed earlier, language is a hierarchical structure with yin and yang elements balanced at different levels. If the balance is lost, a certain degree of language disorder will occur. Apart from the fact that physical and mental disorders may cause speech disorders (e.g., aphasic patients), normal speakers also experience temporary speech disorders (slips of the tongue) in the course of normal speech production, due to loss of temporary yin-yang balance.

Speech production is the process of a speaker translating information and intentions into the language format of a given language. Speech production requires not only the language material, but also the speaker's active cognitive activity -- thinking and planning. Therefore, speech production is a high-level, balanced unity of speech intention (yang) and the concrete language material (yin) used for speech production. The ideal speech production process involves the speech intention that is perfectly matched with the target speech material. But real time speech is filled with paus-

es and hesitations, corrections, repeats and replacements, and even slips of the tongue. In Fromkin's (1971) terms, these anomalous utterances are, in fact, non-anomalous in nature. They reflect the linguistic rules which are misapplied in the course of speech production. Linguists and psychologists (e.g., Caplan, 1984; Garrett, 1988; Fay, 1980; Stemberger, 1985) have been arguing about the real nature of language production using the evidence from speech errors. With the yin-yang theory, speech errors occur simply because of the fact that many factors influence the natural balance of yin and yang at various levels of the speech production mechanism.

Speech intention and speech material are interdependent, but mutually opposing. When speech intention is weak in cases when the speaker is not well prepared for the speech (lack of yang), unplanned speech material will occur, resulting in repetition, pause fillers such as 'ah...', 'uh..', 'well...I mean...' and 'you know...'. On the other hand, when the speaker's speech intention is extremely strong under special circumstances (surplus of yang), the speech material used is often much less than normal, usually resulting in repeated one-word utterances such as 'help', 'fire', and 'stop'. These speech phenomena seem to show the yin-yang waxing and waning process in which the relative balance of the speech is adjusted. Without such yin-yang mutual adjustment in the course of speech production, the spoken discourse will be unnatural and disordered.

When the speaker has formed a speech intention, which is balanced with the matching speech material, the process itself becomes a balanced harmony, given that the intention and the material are already in "due proportion". But this balance can be influenced by factors such as other competing speech intentions which activate the processing of non-targeted items, or other competing lexical items that interfere with the processing of the targeted speech. These competing intentions/lexical items (which can be called extra yang or yin) break the otherwise structural balance of the intended speech, resulting in various types of phonological, syntactical, and semantic speech errors. When a speech intention is formed, the mind (yang) has to select its best balancing lexical items (yin) from among the possible choices (which are usually related to the target in one way or another). If the competing items are over-activated, the balance is lost and an error occurs. For example, when the English lexical item 'trouble' is competing with the targeted item 'problem', the semantic similarity between the two weakens the balancing process of speech production, resulting in 'troublem', an error of the blending type. Freudian slips discussed in Motley (1985) suggest that hidden motives and anxieties are likely to knock the speech production off the yin-yang balance and increase the incidence of speech errors. For example, subjects produced 'bare shoulders' for 'share bolders' (when elicited by a provocatively dressed woman experimenter), 'damn shock' for 'sham dock' (when informed that an electric shock will occur during the experiment) (see Motley 1985). An explanation for this kind of speech error will be that the environmental stimulus causes an extra emotional (yin) influence over the intellectual (yang) performance. The intellectual performance can be balanced if the emotional change of the speaker is within the "due proportion", and the speech production will remain normal, and such errors can be spared. This is why emotionally influenced speakers tend to make more slips of the tongue (Motley 1985).

In general, speech errors of different types provide evidence that language production is processed with interacting speech units at different levels. Speech units of different categories carry yin or yang features. Speech production levels can be high, abstract, and functional (which are of the yang nature), or low, concrete, and positional (which are of the yin nature). When these units at different levels possess the "due proportion" of the yin and yang features, the language structure is balanced and language performance tends to be normal. When the language structure is unbalanced due to many influential factors, speech errors tend to occur.

## 5.0 FURTHER DISCUSSION AND SUMMARY

The ancient Chinese yin-yang theory claims to explain the nature of all the phenomena in the universe, including language behaviors, by the integration of their opposites. Modern linguists seldom realize this claim since modern linguistics is a relatively recent study that has been dominated by western theories. In fact, the approach applied to linguistic research is in itself an event that contains yin and yang factors. If language studies are based too much on theories and concepts that are new, and neglect those that are old, the research will become "unbalanced". What is old must be new first, and must have had its significance and made its contribution. Eastern and Western philosophies are interdependent and mutually fulfilling when they are applied to reasoning about cross-cultural phenomena such as language and communication. A language is healthy when all the yin and yang elements at each level are properly balanced, either due to its internal adjustability or its external influences, such as social, socio-economic, socio-political, or psychological factors. Once such balance is lost, whether at levels of language form, structure, or communicational functions, a language may decay. Returning to the question of "the basic life structure of a language" posed at the beginning of this paper, spoken and written forms of a language are, indeed, the two major forms that represent a language and all its internal structures as well as its communication functions. For however long the history of human language may be, the spoken form has been the dominating form in communication while written language, as a learned complementary communication form, has a history of only a few thousand years. But these two language forms have now become inseparable in today's global communication. Language forms must develop with the development of communication needs to keep the yin-yang balance. Although all natural languages are traditionally believed to function equally well for the communicational purposes of their users, written language conveys a more formal, precise, well-edited message than does spontaneous speech. On the other hand, the liveliness and the subtle tonal or intonational differences of the speech form often fail to be expressed by written language, since speech behaviors vary so much between different speakers and in different contexts. Therefore, a language with both spoken and written forms has a balanced life structure and is much healthier than languages that have only one form in terms of communication, historical records, education and public media, etc. Languages that have written forms are often spoken. If they are not spoken, they are dead (e.g., Latin). Languages with only spoken forms will either develop a written form (like Lushootseed), or eventually be replaced by a "healthier" language that has both forms. With the fast development of science and technology, as well as the ever growing need for global communication, it is evident that the imbalance of language form (which is in violation of the natural law of yin-yang interdependence) could at least limit or reduce a language's productivity and communicational functions. For example, languages with no writing system cannot be used in the rapidly expanding global communication system, such as the internet. When distant written communication through computers becomes a must to people's daily life, the spoken-only languages will be much less encouraged for their use and they face even greater threat for survival.

Language, like any other natural existence, contains yin and yang elements whose mutual opposition, interdependence, mutual supplement and mutual transformation decide the very existence and development of language. Linguists and language users in general should be fully aware of the yin and yang natures of language, follow the law of nature to protect languages, promote language education, encourage the proper use of healthy languages, and prevent language disorders by regularizing and balancing the linguistic yin and yang. Only through the effort of all language users can human language in general remain a harmonious whole.

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