

**EMBRACING EDGES:
SYNTACTIC AND PHONO-SYNTACTIC EDGE SENSITIVITY IN NUPE**

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EMBRACING EDGES: SYNTACTIC AND PHONO-SYNTACTIC EDGE SENSITIVITY IN NUPE^{*}

ABSTRACT

Though well established as grammatical domains within phonology and morphology, edges have recently come to play a central role in both syntactic analysis and explanation within the Minimalist Program. This article adduces further empirical justification for the inclusion of edges into the Minimalist ontology. By way of two case studies, it is demonstrated that reference to edge domains in both the narrow syntax and at the syntax-phonology interface facilitates principled explanations to two unsolved puzzles in Nupe. The first study investigates a peculiar restriction on extraction from perfect domains. The most tenable solution emerges when both phase edges and Edge Features are embraced. New insights into the nature of Edge Features arise as a consequence. The second study concerns the proper characterization of *Comp-trace* effects in the language. The most tenable characterization emerges when they are viewed through the lens of the syntax-phonology interface. *Comp-trace* phenomena are shown to exhibit phono-syntactic edge sensitivity. New insights into the syntax-phonology interface arise as a consequence.

KEYWORDS

EDGE · MINIMALIST PROGRAM · NUPE · EDGE FEATURES · PHASE · PHASE
IMPENETRABILITY CONDITION · EXTRACTION FROM PERFECT DOMAINS · *COMP-TRACE*
EFFECT · SYNTAX-PHONOLOGY INTERFACE

1. Introduction

Historically, the notion of EDGE as a grammatically sensitive domain has received strong support from processes and interactions occurring in both the morphological and phonological wings of grammar. Recently, edges have come to play a prominent role in syntactic analysis as well. As with any theoretical innovation or paradigm shift, two crucial issues are raised. First, how principled is the innovation? Second, what advantages does the new conceptualization offer over the old? This article addresses the latter question by way of case studies of two independent phenomena in Nupe, a Benue-Congo language related to Yoruba that is spoken in central Nigeria. We show that reference to edges in both the narrow syntax and at the syntax-phonology interface facilitates principled explanations to two long-standing

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Abbreviations used in the glosses of examples sentences are as follows: COMP – complementizer; EMPH – emphatic particle; FUT – future; LOC – locative marker; PL – plural; PRF – perfect; PRS – present; PST – past; REL – relativizer/relative clause particle; SG – singular.

unsolved puzzles in the Nupe literature. The argument is thus that a syntactic theory that embraces edges is indeed desirable from an analytical standpoint and thus represents a true step forward.

The first case study showcases narrow syntactic edge sensitivity. A puzzle perennially observed in the Nupe literature is that extraction from tensed clauses is possible, but extraction from perfect clauses is not (Smith 1967, Kandybowicz & Baker 2003).

- (1) a. Ke Musa è/à pa ___ o? [Present/Future TP]
 what Musa PRS/FUT pound ___ o
 ‘What is Musa pounding?’/‘What will Musa pound?’
- b. *Ke Musa á pa ___ o? [Perfect TP]
 what Musa PRF pound ___ o
 ‘What has Musa pounded?’

We argue that the existence of EDGE FEATURES (Chomsky 2005, 2006) allows for an elegant solution to this empirical problem. At the same time, we show that the problem of Nupe perfect extraction sheds light on the very nature of the purported Edge Features that are borne by strong phase heads, i.e. those features responsible for driving cyclic movement to phase edge positions in compliance with the PHASE IMPENETRABILITY CONDITION (Chomsky 2001). Contra Chomsky (2005, 2006), we argue that Edge Features are not inherently active properties of strong phase heads (as least for the *v* phase), but are rather features that, depending on the head that bears them, require activation. In this way, the possibility arises that the Edge Features of a given phase head may either be active or lie dormant in the narrow syntax.

The second case study showcases sensitivity to the edge at the syntax-phonology interface. A-bar movement in Nupe shows clear *Comp-trace* effects.

- (2) a. Zèé, Musa gán [gánán ___ ní enyà] o? [* Subject extraction across C⁰]
 who Musa say COMP beat drum o
 ‘Who did Musa say beat the drum?’
- b. Ke Musa gán [gánán etsu pa ___] o? [√ Object extraction across C⁰]
 what Musa say COMP chief pound o
 ‘What did Musa say that the chief pounded?’

The puzzle in this case is that a seemingly unrelated range of options exist in the language for averting *Comp-trace* violations. These options include the following: phonological reduction of C⁰; insertion of TP-adjoined adverbials; resumption of the displaced occurrence; and spelling out of tense markers. We show that Nupe *Comp-trace* effects can be reduced to violations of the INTONATIONAL PHRASE EDGE GENERALIZATION (An 2007a), a principle requiring that the mapping from syntax to phonology result in an output in which the syntactic edge of every Intonational Phrase is phonetically delimited. The seemingly disparate strategies of *Comp-trace* resolution previously mentioned follow naturally as a consequence.

Taken together, these case studies furnish additional support for the recent edge and phase-based research agenda of the Minimalist Program. Furthermore, the empirical facts presented in this article, both new and striking in a purely descriptive sense, provide decisive evidence in favor of several theoretical reappraisals. These technical innovations arise throughout the course of discussion in both case studies.

2. Case Study 1: Nupe Perfect Extraction

2.1 Problems and Goals

As previously mentioned, the restriction on extraction from perfect domains is an old and yet unsolved problem in the Nupe literature that was first pointed out by Neil Smith in 1967. The data below illustrate the extraction asymmetry.

- (3)
- | | | |
|----|-----------------------------|-------------------------|
| a. | Ke Musa pa _____ o? | [Past TP ¹] |
| | what Musa pound _____ o | |
| | ‘What did Musa pound?’ | |
| b. | Ke Musa è pa _____ o? | [Present TP] |
| | what Musa PRS pound _____ o | |
| | ‘What is Musa pounding?’ | |
| c. | Ke Musa à pa _____ o? | [Future TP] |
| | what Musa FUT pound _____ o | |
| | ‘What will Musa pound?’ | |
| d. | *Ke Musa á pa _____ o? | [Perfect TP] |
| | what Musa PRF pound _____ o | |
| | ‘What has Musa pounded?’ | |

Our first case study investigates this extraction restriction and explores its theoretical consequences for the notion of EDGE FEATURE in the current Minimalist framework. To this end, we confront two types of goals. Our *empirical* goal is simply to derive the extraction facts laid out in (3), while our *theoretical* goal is to determine the extent to which Minimalist technology facilitates an adequate explanation of the Nupe perfect extraction restriction. With respect to our theoretical goal, we will advance two positions. One, the existence of Edge Features (Chomsky 2005, 2006) allows for an elegant account of Nupe’s restriction on perfect extraction. And two, contrary to Chomsky’s conception of them, Edge Features come in two varieties, namely, EXTERNAL EDGE FEATURES (*inherently active* features that drive External Merge) and INTERNAL EDGE FEATURES (*dormant* features requiring activation that drive Internal Merge).

2.2 Deriving the Nupe Perfect Extraction Restriction

2.2.1 The Syntax of Perfect and Tensed Clauses in Nupe

We begin by laying out an account of Nupe clause structure. The analysis presented here will form the backbone for future syntactic discussion. With one or two minor twists, the syntactic analysis presented in this section is the analysis put forth in Kandybowicz and Baker 2003. Space considerations preclude a more lengthy discussion of basic Nupe syntax. The interested reader is invited to consult Kandybowicz and Baker 2003 for further justification of the claims made in this subsection.

Although the structures in (3) appear to be identical, one can show quite easily that they are not. To reach this conclusion, however, a few observations are in order. First, both VO and OV word orders are attested in Nupe. In a manner very much reminiscent of Vata and Gbadi (Koopman 1984), the surface word order of a Nupe clause depends on the clause’s tense/aspect specification. The verb’s argument structure plays a role as well. This is illustrated in (4) below.

¹ Unlike other tense markers in the language, the past tense morpheme in Nupe is pronounced \emptyset .

- (4) a. Musa è/à si dukùn. [VO]
 Musa PRES/FUT buy pot
 ‘Musa is buying/will buy the pot.’
- b. Musa á dukùn si. [OV]
 Musa PRF pot buy
 ‘Musa has bought the pot.’
- c. Musa á le kata-o. [VO]
 Musa PRF sleep house-LOC
 ‘Musa has slept in the house.’

Second, tense markers are independent particles, not verbal prefixes. Evidence comes from the fact that VP-initial adverbs necessarily fall between tense morphemes and the verb, not before T^0 . In this way, we have evidence that verbs do not raise to T^0 in the language.

- (5) Musa (*dàdà) à dàdà ba (*dàdà) nakàn.
 Musa quickly FUT quickly cut quickly meat
 ‘Musa will quickly cut the meat.’

A third (and crucial) observation is that the perfect marker *á* is the exponent of a head lower than T^0 . Support for this claim comes from the fact that the same VP-initial adverbs that necessarily follow T^0 (cf. (5)) must precede the perfect morpheme (cf. (6a) below). Additionally, certain tense markers may co-occur with the perfect particle (cf. (6b) below), illustrating that the two items are not in complementary distribution.

- (6) a. Musa dàdà á (*dàdà) nakàn du.
 Musa quickly PRF quickly meat cook
 ‘Musa has quickly cooked the meat.’
- b. Musa (g)à dàdà á nakàn ba aní.
 Musa FUT quickly PRF meat cut already
 ‘Musa will have quickly cut the meat already.’

Given that it is a phonologically reduced form of the light/serial verb *lá* meaning ‘take’ as in many West African languages (cf. Stahlke 1970) and that the natural home for light verbs is v^0 , we assume that perfect *á* is generated in little v .²

Putting together these observations, we can derive the tense/aspect-contingent word order variations in Nupe. Following Travis (1991), Koizumi (1995), and Baker and Collins (2006), among others, we assume that DPs are case-marked/licensed by functional projections that split or divide the vP layer. DPs check their uninterpretable accusative case features by entering into Agree relations with these functional heads and subsequently raise into their specifier positions. Other case-bearing DPs, including locative objects, do not Agree/raise in this way. We also assume, as is fairly standard, that verb Roots raise to v^0

² We assume that little v is present in all transitive and unergative clauses, where it plays a role in assigning the external theta-role. As such, little v (i.e. v^*) constitutes a phase head in these cases. Whether it is also present in unaccusative clauses is more controversial. We assume that it is, but does not assign a theta-role in that context (cf. Bowers 1993, Baker 2003, Chomsky 2001, 2005, among others). As such, little v is not a phase head when V is unaccusative.

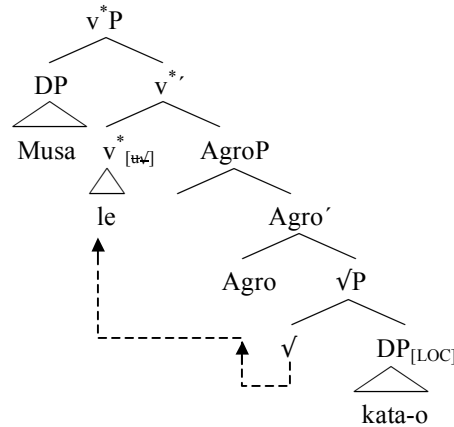
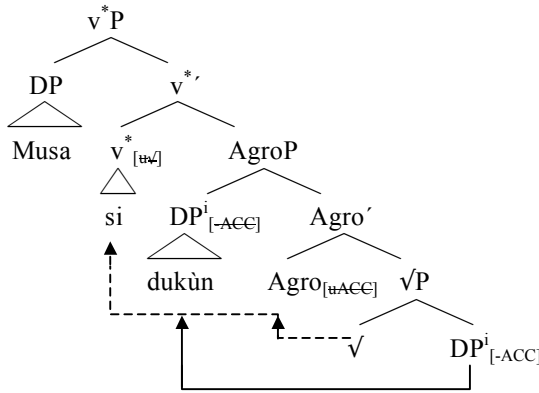
Although the grammaticalization of ‘take’ type light/serial verbs into perfect morphemes and auxiliaries is common in Benue-Congo and West African languages in general, extraction patterns in these cases are not well documented. For this reason, it is not known whether genetically and areally related languages behave in ways similar to Nupe as regards perfect extraction.

unless that head is filled (by the perfect marker, in the case of Nupe). This movement, we take it, is triggered by unvalued uninterpretable \checkmark -features on null (i.e. non-perfect) v^0 , the verbalizing head. Essentially, this ensures that non-perfect v^0 is filled in the narrow syntax. Put another way, null v^0 is a probe. Under this analysis, head-initial accusative verb phrases (i.e. VO_{ACC} syntax (cf. (4a))) are the result of Root raising to v^0 plus case movement. This is illustrated below.

(7) VO_{ACC} syntax = raising to v^0 + case movement

a. Musa si dukùn.
Musa buy pot
'Musa bought the pot.'

b. Musa le kata-o.
Musa sleep house-LOC
'Musa slept in the house.'

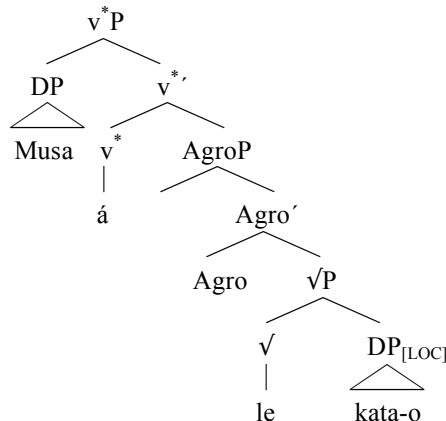
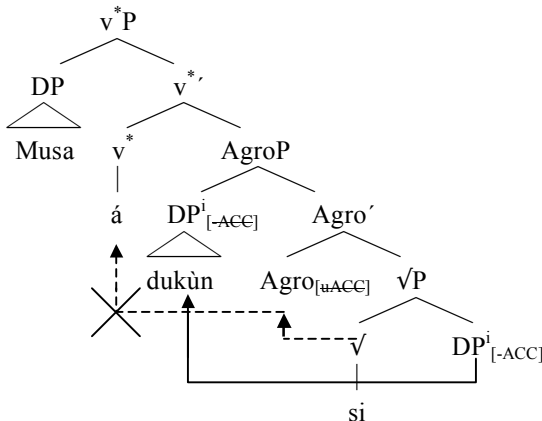


By contrast, head-final accusative verb phrases (i.e. $O_{ACC}V$ syntax (cf. (4b))) result when case movement proceeds, as before, but raising to little v is blocked (i.e. when perfect v^{*0} has content and is thus not a probe). The derivation of OV in Nupe is illustrated below.

(8) $O_{ACC}V$ syntax = case movement - raising to v^0

a. Musa á dukùn si.
Musa PRF pot buy
'Musa has bought the pot.'

b. Musa á le kata-o.
Musa PRF sleep house-LOC
'Musa has slept in the house.'



The upshot of this discussion, then, is that the structures in (3), although seemingly identical, differ with regard to the hierarchical position occupied by the verb Root. In the non-perfect sentences (i.e. (3a-c)), the verb Root occupies v^{*0} . In the perfect construction (i.e. (3d)), where extraction is blocked, the Root does not occupy v^{*0} .

2.2.2 Perfect Extraction Redux

Nupe perfect extraction is more complicated than initially indicated. It turns out that not all instances of extraction from perfect clauses are blocked. More specifically, subjects and high (TP-level) adverbs (of which there are very few in the language) may be extracted in the perfect. (9b) shows the subject successfully extracting over the TP-adverb in the perfect. Likewise, (9c) shows that relativization via subject extraction is also possible in the perfect. In (9d), the presence of the sentence-final particle *o* indicates that although string-vacuous, the TP-adverb has been focused.³ (For more details on the *o* particle in Nupe as well as evidence that *panyi lèé* adjoins to TP, see Kandybowicz 2006.)

- (9) a. Panyi lèé, Musa á nakàn ba. [Neutral]
 before past Musa PRF meat cut
 ‘A long time ago, Musa had cut the meat.’
- b. Musa panyi lèé ___ á nakàn ba o. [Subject focus/extraction]
 Musa before past PRF meat cut o
 ‘A long time ago, MUSA had cut the meat.’
- c. Bagi na ___ á nakàn ba na [Subject relativization]
 man REL PRF meat cut REL
 ‘The man that had cut the meat’
- d. Panyi lèé ___ Musa á nakàn ba o. [High adverb focus/extraction]
 before past Musa PRF meat cut o
 ‘A LONG TIME AGO, Musa had cut the meat.’

Objects and low adverbs/adjuncts, however, may not be extracted in the perfect construction, unless the vP from which they originate does not count as a (strong) phase.

- (10) a. *Nakàn Musa á ___ ba karayín o. [* Direct object focus/extraction]
 meat Musa PRF cut carefully o
 ‘Musa had cut THE MEAT carefully.’
- b. *Etsu Musa á ___ yà èwò o. [* Indirect object focus/extraction]
 chief Musa PRF give garment o
 ‘Musa has given THE CHIEF a garment.’
- c. *Kata bo Musa á le ___ o. [* Locative object focus/extraction]
 room LOC Musa PRF sleep o
 ‘Musa has slept in THE ROOM.’

³ For some speakers, the data in (9b-d) are acceptable, but only marginally so. For others, the same sentences are deemed grammatical/natural. Nonetheless, the same speakers that find (9b-d) marginal judge (10a-e) to be considerably worse and unquestionably ungrammatical.

- d. *Nakàn na bagi á ___ ba na [** Object relativization*]
 meat REL man PRF cut REL
 ‘The meat that the man has cut’
- e. *Karayín Musa á nakàn ba ___ o. [** Low adverb focus/extraction*]
 carefully Musa PRF meat cut o
 ‘Musa had cut the meat CAREFULLY.’
- f. Ke Musa á nikin ___ ni na⁴ o? [*√ Extraction of unaccusative adjunct*]
 how Musa PRF fall EMPH na o
 ‘How has Musa fallen?’

(10a-c) above show that neither themes, goals, nor locative objects may escape from perfect v*P. Likewise, (10d-e) illustrate that when vP counts as a phase, objects may not be relativized and low adverbs may not be extracted. Crucially, however, when vP is non-phasal as in the unaccusative construction in (10f), otherwise illicit extractions become possible.⁵

A better characterization of the Nupe perfect extraction restriction, then, is that movement from *inside* (phasal) v*P (that is, movement from a non v*P edge position) is blocked in the perfect. Further support for this characterization comes from another extraction asymmetry in the language, this time centering on the predicate cleft construction, which, as argued by Kandybowicz (2006), involves the extraction of √P (i.e. a vP-internal projection). The data in (11) below show that in the perfect construction predicate clefting is only blocked when vP counts as a phase. In this case (11a), non-edge aligned √P has illegally evacuated the v*P phase. By contrast, when vP does not count as a phase (as in an unaccusative construction) the same extraction becomes possible in the perfect (11b).

- (11) a. *Bi-ba Musa á ___ nakàn ba o.
 RED-cut Musa PRF meat cut o
 ‘It was CUTTING that Musa had done to the meat (as opposed to, say, cooking).’
- b. Ni-nikin Musa á ___ nikin ni na o.
 RED-fall Musa PRF fall EMPH na o
 ‘It was FALLING that Musa had done (as opposed to, say, stumbling).’

The generalization that interphasal extraction from non phase-edge positions is blocked in the perfect construction suggests that the PHASE IMPENETRABILITY CONDITION (PIC - Chomsky 2000, 2001) is somehow lurking behind this constellation of facts.

2.2.3 Phase Effects

The PIC represents an attempt to return to a strong form of subjacency. Under the PIC, only occurrences residing in the edges of phases are accessible to operations like agreement and movement.

⁴ Although homophonous with the two-part relative clause marker (as seen in (10d), for example), this particular *na* particle represents a distinct morpheme in the language that also cooccurs with the complementizer *ke* (cf. (24a)). For reasons that are unclear at the time of writing, (10f) requires the use of the emphatic particle *ni*. Without this particle, speakers judge sentences like (10f) to be ungrammatical.

⁵ The reader may wonder whether similar extraction patterns obtain in perfect passive and raising to subject constructions (i.e. cases when v⁰ fails to assign an external theta role and thus instances in which the vP does not count as a phase). Unfortunately, Nupe does not have a passive construction/operation nor does it have biclausal infinitival constructions, so these cases cannot be tested.

(12) PHASE IMPENETRABILITY CONDITION (Chomsky 2001)

In phase α with head H (restricting attention to cases where “phase” = $\{v^*P, CP\}$), the domain of H is not accessible to operations outside α . Only H and its edge (specifier(s)) are accessible to such operations.

In this way, the edge of a phase is syntactically transparent, while the complement of a phase head (i.e. the residue) is syntactically opaque. Under the PIC, evacuation from a phase is therefore contingent on an intermediate stage in the derivation in which the displaced occurrence occupies a position at the edge of the phase. Insofar as it has been shown to represent a promising avenue of research, the PIC offers a window through which we can attempt to reconcile the extraction facts laid out in the previous subsection.

Consider first those instances in which perfect extraction is tolerated. Regarding extraction of the subject (cf. (9b,c)), the DPs in question are presumably merged in Spec, v^* by the VP-internal subject hypothesis and thus their displacement proceeds unproblematically from the edge of the v^* phase. In the case of TP-level adverb extraction (cf. (9d)), the constituents are base merged outside the v^* phase. Thus, their extraction is not limited by the PIC. When vP does not count as a phase, as in unaccusative constructions (e.g. (10f) and (11b), cf. Den Dikken 2006a, but contra Legate 2003), extraction is once again unrestricted by the PIC.

Under the lens of the PIC, now consider those cases in which perfect extraction is blocked. Regardless of which variety (cf. (10a-d)), Nupe objects inhabit non phase-edge positions within the split v^*P structure (cf. (7) and (8)). Thus, if they are to extract, object DPs must first move to the edge of v^*P in compliance with the PIC. Low adverbs/adjuncts share the same fate as objects. Since they do not occupy phase head/edge positions, they must cyclically raise through the v^*P edge to evacuate. Although they cannot escape v^*P in nominative perfect constructions, objects and low adjuncts *can* be extracted from v^*Ps in all other tenses in the language. Consider the following data.

- (13) a. Nakàn Musa è ba ___ o. [Compare with (10a)]
 meat Musa PRS cut ___ o
 ‘Musa is cutting THE MEAT.’
- b. Nakàn na bagi ba ___ na [Compare with (10d)]
 meat REL man cut ___ REL
 ‘The meat that the man cut’
- c. Karayín Musa à ba nakàn ___ o. [Compare with (10e)]
 carefully Musa FUT cut meat ___ o
 ‘Musa will cut the meat CAREFULLY.’

This suggests that Nupe objects/adjuncts can *in principle* access the v^* phase’s edge position in non-perfect clauses, but for whatever reason, the edge of the v^* phase is not accessible in perfect constructions. To make sense of this claim and the forthcoming analysis it engenders, we turn now to a brief discussion of Edge Features.

2.2.4 Edge Features

Chomsky (2005, 2006) proposes that all Merge operations are driven by features he dubs EDGE FEATURES (EFs). As such, EFs are claimed to represent irreducible primitives of Universal Grammar. Chomsky maintains that EFs belong to the class of uninterpretable features, yet unlike other uninterpretable features, they are undeletable (up to the point of Transfer). In this way, unbounded Merge (i.e. recursion) is accounted for within the computational system. With the exception of interjective

occurrences, EFs are held to be present on all nodes/lexical items and are required to be satisfied at least once during the course of a convergent derivation by way of some variety of Merge.

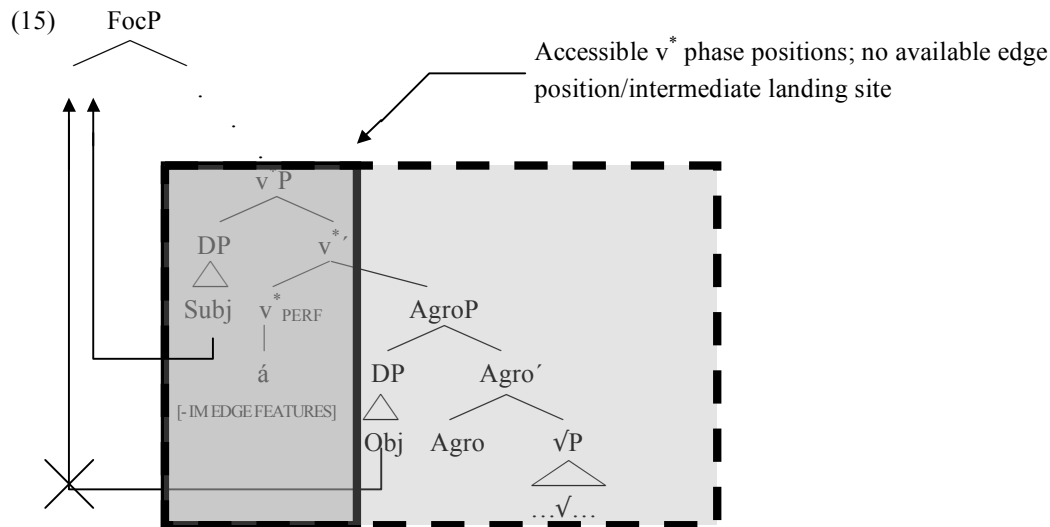
Chomsky (2005:11, 2006:17) also proposes that although there are necessarily (and minimally) two types of Merge (External Merge (EM) and Internal Merge (IM)), there is only one species of EF. In his 2006 system, the fundamental difference between EM and IM reduces to a difference between phase heads and non phase heads with regard to EFs. To be precise, EFs on non phase heads drive EM, while EFs on phase heads drive IM, specifically, A-bar movement. However, because A-movement involves IM to a non phase head, Chomsky is forced to stipulate the existence of a feature inheritance operation under which A-movement is driven by Agree plus EF inheritance from a higher phase head (e.g. the A-movement driving EFs of T^0 are inherited from C^0). We will return momentarily to present a possible way around making such a stipulation, while at the same time deriving EM and IM from EFs. For the time being, we can close this subsection by pointing out one other important facet of EFs, which is that EFs on phase heads seem to instantiate the current version of Chomsky’s (2000) GENERALIZED EPP FEATURES.

2.2.5 Analysis (a First Pass)

Given the current Minimalist perspective on phases and Edge Features outlined in the two previous subsections, the most straightforward way to derive the observed extraction asymmetry in Nupe would be to state that in agentive perfect clauses, v^* is simply merged without IM-driving EFs, unlike v^* in non-perfect clauses. This would be consistent with Chomsky’s older (2000) claim that EFs (“Generalized EPP features” in his terminology) are *optional* properties of phase heads.

(14) The head of a phase *may* be assigned an EPP feature. (Chomsky 2000:109)

On this analysis, if perfect v^{*0} fails to bear IM-driving EFs, then vP-internal XPs extracted from non-edge positions (i.e. objects/adjuncts) will move to their targets in one fell swoop, violating the PIC. On the other hand, because subjects and vP external adjuncts are merged either at the edge of the v^* phase or above/outside it, as the case may be, their extraction will comply with the PIC and comes for free, so to speak. In this way, an account of the Nupe perfect extraction asymmetry emerges.



We can ask how well this proposal fares on grounds of descriptive and explanatory adequacy. Optionality of EF assignment yields descriptively adequate results but its stipulative nature renders it explanatorily suspect. In fact, the optionality approach misses an important generalization about Nupe

extraction, which is that movement to v^{*0} is a precondition for extraction from v^*P in Nupe, itself an observation very much akin to Holmberg's Generalization (Holmberg 1986, 1999). In the perfect construction, the perfect marker *á* blocks raising to v^{*0} (cf. (8)) and consequently, non-edge vP material fails to extract. In all other tenses, however, raising to v^{*0} proceeds (cf. (7)) and non-edge vP material is able to extract. The most tenable analysis should be able to derive this generalization.

2.2.6 A More Tenable Analysis

The theoretical problem posed by Nupe perfect extraction is that contra Chomsky 2005, 2006, some phase heads appear to lack IM-driving EFs. Intuitively, the solution we are looking for is one in which the existence of EFs on v^{*0} is contingent in some way on head raising to v^{*0} . We propose, therefore, that IM-driving EFs are *dormant* features, that is, features that are lexically/structurally present, but that require activation in the narrow syntax. In the case at hand, this would mean that for whatever reason, the EFs of the perfect v^*P phase in Nupe are dormant (inactive), preventing extraction of phase-internal material, while the EFs of non-perfect v^*P phases are somehow active (non-dormant), thus allowing extraction across the board from within v^*P .

If this hypothesis is on the right track, there is an immediate corollary, namely, that contra Chomsky 2005, 2006, there must be a typology of Edge Features. Specifically, if the EFs that drive IM are dormant, there must be another type of EF distinct from the IM-driving variety that conditions EM. This conclusion follows from the trivial fact that the EFs underlying EM are necessarily non-dormant, otherwise unbounded Merge would be both unexpected and exceedingly difficult to derive. In other words, if we maintain the existence of dormant IM-driving EFs, basic Minimalist considerations force the postulation of a second type of EF that is non-dormant and EM-driving. We therefore propose the following EF typology.

(16) Edge Feature Typology:

EXTERNAL EDGE FEATURES (EEFs) drive EM and do not require activation.

INTERNAL EDGE FEATURES (IEFs) drive IM and are dormant (i.e. require activation).

This, of course, raises an important question. What is the activation condition for IEFs? Our hypothesis is that IEFs are activated by Agree. The Holmberg-style generalization laid out at the end of the previous section now follows. In Nupe, $\emptyset v^{*0}$ is a probe bearing unvalued uninterpretable \check{v} -features satisfied by the verb Root (the goal) [cf. (7) and the discussion in section 2.2.1]. The two occurrences enter into an Agree relation triggering a) activation of v^{*0} 's IEFs, b) head movement of the Root to v^{*0} in satisfaction of those IEFs, and c) toleration of IM to the edge of the phase. Perfect v^{*0} *á*, on the other hand, is not a probe (perhaps because *á* is verbal in some sense - cf. the historical considerations below (6)). Since it is not a probe, it does not Agree. Hence, its IEFs fail to be activated and Root raising to v^{*0} does not proceed. Consequently, non-edge extraction across this head results in a violation of the PIC due to the impossibility of successive cyclic movement through the edge of the v^* phase.

Further supporting evidence for this proposal comes from the fact that even when the launching site of movement is external to the v^* phase, all extraction across the perfect morpheme in v^{*0} is impossible. That is, successive cyclic movement cannot obtain in these cases due to the fact that the edge of an intermediate phase is unavailable. The data in (17) below illustrate that the subject/object/low adjunct extraction asymmetry previously observed in the perfect construction is neutralized in such instances.

- (17) a. *Nana Musa á gan gánán ___ pa eci o. [* Embedded subject extraction]
 Nana Musa PRF say COMP pound yam o
 'Musa has said that NANA pounded the yam.'
- b. *Eci Musa á gan gánán Nana pa ___ o. [* Embedded object extraction]
 yam Musa PRF say COMP Nana pound o
 'Musa has said that Nana pounded THE YAM.'

- c. *Karayín Musa á gan gánán Nana pa eci ____ o. [* Embedded adjunct extraction]
 carefully Musa PRF say COMP Nana pound yam o
 ‘Musa has said that Nana pounded the yam CAREFULLY.’

Our proposal is also supported by recent findings by Gallego (2006), Gallego & Uriagereka (2006), and Den Dikken (2006b, 2007) that the Edge Feature properties of phase heads are variable and crucially depend on head movement/Agree operations in the narrow syntax.

2.3 Theoretical Ramifications

The proposal on offer has a number of attractive theoretical consequences. For one, the mismatch between the varieties of Merge and the number of types of EFs in UG is eliminated. Under this framework, there are two types of Edge Features and two attendant types of Merge. Another ramification is that Chomsky’s (2006) stipulation that A-movement is driven by Agree plus inheritance of EFs can be eliminated. Under the current proposal, A-movement is driven by Agree alone because Agree activates the IEFs of non phase heads. This is desirable because the core operations of the computational system can be kept to a bare minimum. We needn’t add the operation Inherit to the already minimal set of operations {Merge, Copy}, but under Chomsky’s proposal this move would become necessary.

Throughout the course of this case study, only one example of IEF dormancy was presented. Nonetheless, others can be found. One such instance is characterized by restrictions on IM to the edges of non-interrogative/focal C phases. In the following examples, embedded C^0 is not a probe and thus does not enter into an Agree relation. As such, C^0 ’s IEFs remain dormant, preventing gratuitous IM to its edge.

- (18) a. *Smith thought [Chomsky_i that t_i wrote *Barriers*].
 b. *Smith knows [will_i Chomsky t_i write a book on phases].

Thus, a third consequence of our proposal is that restrictions on IM to various phase edges can be straightforwardly explained.

The fourth and fifth theoretical ramifications of our proposal raise issues that are beyond the scope of this article and are thus left for future research. The first of these is that because IM is driven by IEFs and because IEFs are activated by Agree relations, there can be no movement without Agree. But what about the inverse? Can there be Agree without movement in this system? The difficulty in answering this question stems from the fact that the possibility of lower copy spell-out at PF often obscures the detection of a movement operation. Thus, what might appear on the surface to be an instance of Agree without IM might in fact turn out to be Agree + IM + lower copy spell-out. The final theoretical ramification also takes the form of a question. Why should some but not all EFs (e.g. IEFs) be dormant/require activation? Can this be explained by appealing to interface conditions or principles of computation not indigenous to the Language Faculty? Again, we leave these questions for future research.

2.4 A Semantic/Pragmatic Account?

We conclude this case study by briefly considering whether the restriction on perfect extraction examined in this section can be reduced to semantic/pragmatic principles rather than syntactic ones. Here we explore one semantic/pragmatic reduction that we take to be the most promising proposal within this class of analyses, ultimately rejecting it in favor of the purely syntactic approach previously outlined.

Consider the distribution of the telic/completive verb *zo* ‘to finish’. *Zo* is licensed in contexts that semantically encode completion/culmination. The data in (19a-b) below show that *zo* can occur serialized with telic/accomplishment verbs in any tense, while the remaining data (19c-d) illustrate that *zo* cannot appear serialized with atelic/activity predicates in any tense.

- (19) a. Musa ká lítáfi zo.
Musa write book finish
'Musa finished writing the book.'
- b. Musa è du cènkafa zo.
Musa PRS cook rice finish
'Musa is finishing cooking the rice.'
- c. #Musa nì enyà zo.
Musa beat drum finish
'Musa finished beating the drum.'
- d. #Musa è pa eci zo.
Musa PRS pound yam finish
'Musa is finishing pounding the yam.'

Interestingly, the data in (19c-d) improves if *zo* is under the scope of either the perfect marker (cf. 20a) or focus (delimited by *o*⁶ (cf. 20b)).

- (20) a. √Musa á enyà nì zo. [Compare with (19c)]
Musa PRF drum beat finish
'Musa has finished beating the drum.'
- b. √Musa è pa eci zo o. [Compare with (19d)]
Musa PRS pound yam finish o
'MUSA is finishing pounding the yam.'

On the force of these facts, one might suggest the following hypothesis. In Nupe, both perfect and focus constructions semantically encode event completion/culmination. Because they serve the same semantic function, focus movement is semantically redundant in the perfect and is consequently ruled out on pragmatic grounds.

There are three reasons for rejecting such an analysis. One, although it is standardly assumed that perfect utterances assert the culmination of an eventuality (Moens 1987, Parsons 1990, Steedman 1994, Giorgi & Pianesi 1997), focus constructions are not generally understood to function in this way semantically. Two, it is not clear why it should be semantically/pragmatically *impossible* to express something redundant. Language is, after all, riddled with redundancy. Three, the analysis provides no account of non focus-related extraction restrictions in the perfect. The data in (21) repeats a previous example involving relativization, an instance of topicalization, not focus, which is still ruled out by the grammar.

- (21) *Nakàn na bagi á ba na
meat REL man PRF cut REL
'The meat that the man has cut'

Because the syntactic approach previously developed both predicts and accounts for the ungrammaticality of examples like (21), we conclude that the restrictions on extraction from perfect clauses in Nupe are inherently syntactic, not semantic.

⁶ This is a bit of an oversimplification. See Kandybowicz 2006 on the *o* particle and its relation to the Focus projection.

2.5 Summary of Case Study 1

In Nupe, restrictions on extraction from v^*P are purely syntactic, crucially make reference to edges, and ultimately hinge on whether $\text{Agree}(v^{*0}, v^0)$ (and subsequently, verb raising to v^{*0}) has taken place. Subjects and high adjuncts can extract regardless; objects and low adjuncts can only extract if the verb Root is the Goal of a v^{*0} probe. Although Roots are the goals of v^{*0} probes in non perfect constructions, they are not goals in perfect constructions. Because v^*P counts as a phase on virtually all approaches to cyclic spell-out, extraction from v^*P must respect the Phase Impenetrability Condition. Edge Features lie at the heart of PIC compliance. If v^{*0} lacks EFs, then both lower phase-external and non-peripheral phase-internal material (i.e. objects and low adjuncts) will fail to occupy an intermediate position at the phase edge, preventing extraction beyond the v^*P layer. We proposed two varieties of EFs that correspond exactly to the two types of Merge operations in natural language. These features are differentiated on the basis of whether or not they need to be activated. Internal Merge is driven by Internal Edge Features, features that require activation. External Merge is driven by External Edge Features, features that do not require activation. We claimed that EF activation is triggered by Agree . The Nupe perfect morpheme in v^{*0} is not a probe, therefore it neither Agrees nor activates the phase head's IEFs. In this way, the restriction on extraction from perfect domains follows directly from the PIC. The entire house of cards, so to speak, rests on the concept of EDGE as a grammatically sensitive domain in the narrow syntax.

3. Case Study 2: Nupe *Comp-trace* Effects

3.1 Situating the Case Study

We turn our attention next to edge sensitivity at the PF interface level. Once again, Nupe provides a challenging puzzle that without reference to edges, leaves the analyst grappling in the dark. This puzzle comes in the form of the *Comp-trace* (C-t) effect and the seemingly unrelated ways in which the effect may be obviated in the language. The goal of this case study then, is to motivate a PF-centric characterization of the *Comp-trace* effect in Nupe that crucially references edge positions at the syntax-phonology interface. Although this goal is simple enough, the outcome is far-reaching if correct, for it calls into question over three decades of generative research on the C-t effect as a purely narrow syntactic phenomenon.

By way of brief introduction, the C-t effect is regarded as one of the quintessential subject–non-subject extraction asymmetries. It is standardly taken to describe the outcome of certain movement operations in which subjects are displaced across overtly headed clause boundaries. As shown below, subjects, unlike objects and adjuncts, cannot be long extracted across overt complementizers in a number of different constructions in English. Similar facts obtain in many other languages.

(22) *WH*- QUESTION

- a. Who do you think [(that) ___ wrote the book]?
- b. What do you think [(that) Bill wrote ___]?
- c. Why do you think [(that) Bill wrote the book ___]?

EMBEDDED RELATIVE CLAUSE

- d. The author [that the publisher predicts [(that) ___ will be adored]]
- e. The book [that the publisher predicts [(that) the public will adore ___]]

CLEFT CONSTRUCTION

- f. It was John [that the author told us [(that) ___ had plagiarized her book]].
- g. It was her book [that the author told us [(that) John had plagiarized ___]].
- h. It was yesterday [that the author told us [(that) John had plagiarized her book ___]].

COMPARATIVE CONSTRUCTION

- i. I wrote more books than I estimated [(that) __ would be written].
 j. I wrote more books than I estimated [(that) the entire department would write __]].

Crucially, however, subject extraction across some complementizers *is* allowed, as in the case of matrix subject relative clauses and clefts. In fact, for most speakers, extraction is only possible in these cases if C^0 is overt.

- (23) a. The boy [(that) __ bottles fireflies]
 b. It's my cousin [(that) __ bottles fireflies].

A similar effect obtains in Nupe. The data below show that only subjects are restricted from extracting across C^0 , with the exception of matrix subject relativization as in English.

- (24) a. √ EXTRACTION OF AN EMBEDDED OBJECT *WH*-
 Ke u: bè [ke Musa du __] na o?
 what 3RD.SG seem COMP Musa cook na o
 'What does it seem that Musa cooked?'
- b. √ FOCUS OF AN EMBEDDED ADJUNCT
 Karayín, Musa kpe [gàrán etsu nì enyà __] o.
 carefully Musa know COMP chief beat drum o
 'Musa knew that the chief beat the drum CAREFULLY.'
- c. √ RELATIVIZATION OF AN EMBEDDED OBJECT
 Nakàn [na Musa kpe [gàrán bagi-zì ba __]] na
 meat REL Musa know COMP man-PL cut REL
 'The meat that Musa knew that the men cut'
- d. * EXTRACTION OF AN EMBEDDED SUBJECT *WH*-
 *Zéé u: bè [ke __ du nakàn] na o?
 who 3RD.SG seem COMP cook meat na o
 'Who does it seem cooked the meat?'
- e. * FOCUS OF AN EMBEDDED SUBJECT
 *Etsu, Musa gàn [gàrán __ nì enyà] o.
 chief Musa say COMP beat drum o
 'Musa said that THE CHIEF beat the drum.'
- f. * RELATIVIZATION OF AN EMBEDDED SUBJECT
 *Bagi-zì [na Musa kpe [gàrán __ ba nakàn]] na
 man-PL REL Musa know COMP cut meat REL
 'The men that Musa knew cut the meat'
- g. √ RELATIVIZATION OF A NON-EMBEDDED SUBJECT
 Bagi [na __ ba nakàn] na
 man REL cut meat REL
 'The man that cut the meat'

The C-t effect has spawned a vast literature in the generative tradition. The earliest approaches (e.g. Perlmutter 1971 and Chomsky & Lasnik 1977) accounted for the effect in representational terms,

culminating in the ECP-driven analyses of the GB program (notably, Chomsky 1981, 1986, Kayne 1981, and Rizzi 1990, among many others). In response to the recent Minimalist paradigm shift, the ECP analyses of the GB era have been largely jettisoned and replaced with derivational characterizations (cf. Deprez 1994, Szczegielniak 1999, Pesetsky and Torrego 2001, Hoge 2001, Roussou 2002, Ishii 2004, Rizzi 2004, among others). Although the character of these accounts varies somewhat, the central theme unifying them all is the view that *complementizer-trace* outputs are somehow *syntactically* ill-formed. Now, a widely held view in generative linguistics is that the computational system (i.e. the syntactic component) manifests considerably less variation comparatively speaking than other modules, for instance, phonology and morphology (i.e. the modules of the PF wing of grammar). Viewed from this perspective, the plausibility of a purely syntactic characterization of C-t effects is called into question by the existence of both considerable inter-linguistic and intra-linguistic variation. Inter-linguistically, for example, C-t effects do not obtain in Arabic, Basque, Hausa, Serbo Croatian, and Warlpiri (Perlmutter 1971), nor do they surface in Modern Hebrew (Borer 1984, Shlonsky 1988), West Flemish (Haegeman 1992), Icelandic (Maling and Zaenen 1978), Japanese (Ishii 2004), or Hindi (Rajesh Bhatt, personal communication), to name a few languages. We often find considerable variation within a given language as well. For instance, although many dialects of English manifest the effect, Midwestern dialects (Sobin 1987), varieties of African American English (Pesetsky 1982), certain populations of L1 (Thornton 1990, McDaniel et. al 1995) and L2 (Gathercole and Montes 1997) learners, and some dialects of British English (Guest 2001) lack the effect. Similarly, certain dialects of Dutch (Maling and Zaenen 1978, Bennis 1980, Reuland 1983), German (Bayer 1984), and French (Pesetsky 1982), among others, show variable C-t behavior as well. At the very least, these facts encourage exploration of alternative (i.e. non-narrow syntactic) characterizations of C-t effects. Although a minority, a small body of PF-based research in this regard has persisted in the face of a syntactically dominated literature (cf. Aoun et. al 1987, Culicover 1993b, Richards 1999, Merchant 2001, to appear, and de Chene 1995, 2000, 2001).

The present case study follows in this PF-oriented tradition. In this spirit, we will argue that the Nupe C-t effect is fundamentally a prosodic phenomenon that is sensitive to properties that crucially reference the edges of phono-syntactic domains.

3.2 Description and Analysis

3.2.1 Empirical Observations

Extraction out of embedded clauses in Nupe exhibits a subject–non-subject asymmetry similar to that found in English, however, some of the details vary. In Nupe as in English, objects can be freely extracted across complementizers in a number of different construction types, unlike subjects. The data in (24) is repeated below, illustrating this asymmetry with respect to *wh*- movement, focus, and relativization.

- (25) a. √ EXTRACTION OF AN EMBEDDED OBJECT *WH*-
 Ke u: bè [ke Musa du ___] na o?
 what 3RD.SG seem COMP Musa cook na o
 ‘What does it seem that Musa cooked?’
- b. √ FOCUS OF AN EMBEDDED ADJUNCT
 Karayín, Musa kpe [gàrán etsu nì enyà ___] o.
 carefully Musa know COMP chief beat drum ___ o
 ‘Musa knew that the chief beat the drum CAREFULLY.’
- c. √ RELATIVIZATION OF AN EMBEDDED OBJECT
 Nakàn [na Musa kpe [gàrán bagi-zì ba ___]] na
 meat REL Musa know COMP man-PL cut REL
 ‘The meat that Musa knew that the men cut’

- d. * EXTRACTION OF AN EMBEDDED SUBJECT *WH*-
 *Zèé u: bè [ke __ du nakàn] na o?
 who 3RD.SG seem COMP cook meat na o
 ‘Who does it seem cooked the meat?’
- e. * FOCUS OF AN EMBEDDED SUBJECT
 *Etsu Musa gàn [gànan __ ni enyà] o.
 chief Musa say COMP beat drum o
 ‘Musa said that THE CHIEF beat the drum.’
- f. * RELATIVIZATION OF AN EMBEDDED SUBJECT
 *Bagi-zì [na Musa kpe [gànan __ ba nakàn]] na
 man-PL REL Musa know COMP cut meat REL
 ‘The men that Musa knew cut the meat’

Omitting the complementizer does not salvage a C-t violation in Nupe as it does in English. For the most part, complementizer drop is disallowed in the language as in French (Deprez 1994), Dutch, and Icelandic (Pesetsky 1982), among other languages.⁷

- (26) a. *Zèé u: bè [__ du nakàn] na o? [Compare with (25d)]
 who 3RD.SG seem cook meat na o
 ‘Who does it seem cooked the meat?’
- b. *Etsu Musa gàn [__ ni enyà] o. [Compare with (25e)]
 chief Musa say beat drum o
 ‘Musa said that THE CHIEF beat the drum.’
- c. *Bagi-zì [na Musa kpe [__ ba nakàn]] na [Compare with (25f)]
 man-PL REL Musa know cut meat REL
 ‘The men that Musa knew cut the meat’

Nonetheless, a range of options exists in the language for salvaging derivations involving long subject extraction across embedded complementizers. For one, extraction of an embedded subject across the complementizer *gànan* is possible when the complementizer surfaces in its reduced form *’án*. *Gànan* is historically related to the verb *gàn* ‘say’, as in many West African languages. The form *gànan*, then, can be analyzed as a composite morpheme comprised of the verb ‘say’ together with a C⁰ element (e.g. *gàn_V* + *án_C*). When reduced, then, only the C⁰ element surfaces.

- (27) REDUCTION OF A MULTISYLLABIC C⁰ MITIGATES C-T EFFECTS⁸
 a. Zèé Musa gàn [’án __ ni enyà] o?
 who Musa say COMP beat drum o
 ‘Who did Musa say beat the drum?’

(Bad as: *Zèé Musa gàn **gànan** __ ni enyà o?)

⁷ See Kawu 1990 for a discussion of the few exceptions to this rule in Nupe.

⁸ This repair strategy does not improve C-t violations involving complementizers other than *gànan* in the language because all other complementizers in Nupe are monosyllabic and phonologically irreducible.

- b. Etsu Musa gàn [’án __ nì enyà] o. [Compare with (25e)]
 chief Musa say COMP beat drum o
 ‘Musa said that THE CHIEF beat the drum.’
- c. Bagi-zì [na Musa kpe [’án __ ba nakàn]] na [Compare with (25f)]
 man-PL REL Musa know COMP cut meat REL
 ‘The men that Musa knew cut the meat’

A second way C-t effects can be mitigated in Nupe is by insertion of TP-adjoined adverbials. Similar to the English Adverb Effect, embedded subject extraction becomes possible when an adverbial expression intervenes between the complementizer and the trace (i.e. when it attaches to TP). This is illustrated below for the TP-adverbial *pányi lèé*, which was introduced earlier in section 2.2.2.

(28) INSERTION OF TP-ADJOINED ADVERBIALS MITIGATES C-T EFFECTS

- a. Zèé Musa gàn [gànan **pányi lèé** __ nì enyà] o?
 who Musa say COMP before PST beat drum o
 ‘Who did Musa say that a long time ago beat the drum?’
- (Bad as: *Zèé Musa gàn **pányi lèé** gànan __ nì enyà o?)
- b. Etsu Musa gàn [gànan **pányi lèé** __ nì enyà] o. [Compare with (25e)]
 chief Musa say COMP before PST beat drum o
 ‘Musa said that a long time ago THE CHIEF beat the drum.’
- c. Bagi-zì [na Musa kpe [gànan **pányi lèé** __ ba nakàn]] na [Compare with (25f)]
 man-PL REL Musa know COMP before PST cut meat REL
 ‘The men that Musa knew that a long time ago cut the meat’

Subject extraction across a complementizer can also proceed if the moved element (i.e. a lower copy of the subject) is spelled-out as a resumptive pronoun in Spec, TP, provided that it agrees in number with the head of the chain. Similar cases abound in Swedish, Dutch, and Danish. The data below show that the resumptive occurrence is limited to an agreeing pronominal – perfect copies of the chain head are excluded, as are non-agreeing copies. The resumptive occurrence necessarily follows the complementizer and precedes tense markers (cf. (29a,c)), indicating that it is spelled out in Spec, TP, as opposed to either Spec, CP or Spec, vP. For additional arguments that the resumptive occurrence is realized in Spec, TP, see Kandybowicz 2006.

(29) RESUMPTION OF A LOWER COPY OF THE SUBJECT MITIGATES C-T EFFECTS

- a. Zèé_i u: bè [ke **u_i/*a_i/*zèé_i** du nakàn] na o? [Compare with (25d)]
 who 3RD.SG seem COMP 3RD.SG/3RD.PL/who cook meat na o
 ‘Who does it seem cooked the meat?’
- (Bad as: *Zèé_i u: bè **u_i**; ke du nakàn na o.)
- b. Etsu_i Musa gàn [gànan **u_i/*a_i/*etsu_i** nì enyà] o. [Compare with (25e)]
 chief Musa say COMP 3RD.SG/3RD.PL/chief beat drum o
 ‘Musa said that THE CHIEF beat the drum.’
- c. Bagi-zì_i [na Musa kpe [gànan **a_i/*u_i/*bagi-zì_i** à ba nakàn]] na
 man-PL REL Musa know COMP 3RD.PL/3RD.SG/man-PL FUT cut meat REL
 ‘The men that Musa knew would cut the meat’
- (Bad as: * Bagi-zì_i na Musa kpe gànan à **a_i**; ba nakàn na) [Compare with (25f)]

Lastly, C-t effects in Nupe fail to arise whenever embedded T^0 is phonetically realized. In all of the ungrammatical Nupe examples examined thus far in this subsection, embedded T^0 was phonetically null. (Recall that null T^0 is the exponent of the past tense morpheme in the language.) As illustrated below, long extraction of an embedded subject across overt C^0 becomes acceptable when T^0 is spelled-out (even without lower subject resumption or TP-adverbial adjunction).

- (30) SPELLING OUT EMBEDDED CLAUSE T^0 MITIGATES C-T EFFECTS
- a. Zèé Musa gàn [gànáń ___ *Ø/√è/à ní enyà] o?
 who Musa say COMP PST/PRS/FUT beat drum o
 ‘Who did Musa say is beating/will beat the drum?’
- b. Etsu Musa gàn [gànáń ___ *Ø/√è/à ní enyà] o. [Compare with (25e)]
 chief Musa say COMP PST/PRS/FUT beat drum o
 ‘Musa said that THE CHIEF is beating/will beat the drum.’
- c. Bagi-zì [na Musa kpe [gànáń ___ *Ø/√è/à ba nakàn]] na. [Compare with (25f)]
 man-PL REL Musa know COMP PST/PRS/FUT cut meat REL
 ‘The men that Musa knew were cutting/would cut the meat’

To reiterate an earlier point, the puzzle posed by these C-t repair strategies is that from a syntactic perspective, they are seemingly unrelated.

3.2.2 Analysis

When the data in the previous subsection are reexamined with edges in mind, a generalization emerges where at first blush there appeared to be no unifying patterning. Long extraction of embedded subjects is possible whenever the output of a derivation is one in which the “edge” of the embedded TP projection (i.e. either a daughter of TP or T^0) is realized at PF. Here, we understand “edge” in the Minimalist sense of the term; that is, as the left-peripheral specifier and head projections of a given syntactic domain (cf. the way it is formulated in the PIC (12)). Mitigating adverbial expressions like *pányi lèé* occupy a TP edge (adjoined) position, as do resumptive lower copies in Spec, T and tense markers in T^0 . Whenever the embedded TP edge is phonetically empty (i.e. whenever the tail of a non-trivial chain is deleted at PF and neither a TP adverbial nor tense marker is pronounced), the output of long subject extraction is illicit. What underlies this generalization? In the discussion that follows, we provide an answer to this question.

The key fact around which everything will turn is a prosodic one. In Nupe, embedded unreduced/non-relative complementizers (e.g. *gànáń* and *ke*) mark the right boundaries of prosodic domains, more specifically, Intermediate Phrases⁹ (INTPs). As such, the complement of embedded C^0 in the language is itself an independent prosodic domain. In fact, fully propositional embedded TPs are obligatorily parsed as separate Intermediate Phrases in Nupe. In contrast, embedded TPs following reduced complementizers (e.g. *’án*) are not parsed as separate INTPs in the language. The evidence that unreduced non-relative embedded complementizers mark the juncture of two prosodic domains in Nupe comes from a number of empirical observations. For one thing, a small pause separates C^0 from material in the embedded TP. Second, pre-pausal lengthening can be detected. That is, the complementizer is slightly lengthened when it occurs in an embedded position. A third line of evidence comes from the fact that following the phonetic realization of C^0 , pitch is reset. The fourth and most compelling piece of evidence comes from the fact that otherwise regular phonological processes are blocked when C^0 introduces a complement clause. (31) below illustrates that the otherwise regular process of regressive

⁹ Within the prosodic hierarchy, the Intermediate Phrase represents the second most prominent prosodic domain after the Intonational Phrase.

assimilation is blocked in this environment, while (32) highlights the fact that hiatus resolution is likewise blocked.

- (31) a. PHRASE-INTERNAL ASSIMILATION:
/[gàná + u:]/ → [gùnú u:]
- b. ASSIMILATION BLOCKED ACROSS PHRASE BOUNDARIES:
[_{INTP} Zéé Musa gán gánán/*gùnú] [_{INTP} u: du nakàn na o]?
who Musa say COMP 3RD.SG cook meat na o
‘Who did Musa say cooked the meat?’
- (32) a. PHRASE-INTERNAL HIATUS RESOLUTION VIA GLIDE FORMATION:
/[ke + u:]/ → [kju:]
- b. GLIDE FORMATION BLOCKED ACROSS PHRASE BOUNDARIES:
[_{INTP} Zéé u: bè ke/*kj] [_{INTP} u: du nakàn na o]?
who 3RD.SG seem COMP 3RD.SG cook meat na o
‘Who does it seem cooked the meat?’

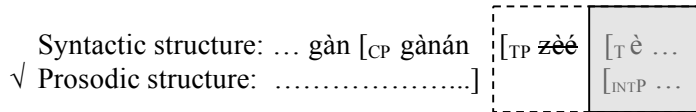
Let us build on this observation. According to Nespov and Vogel (1986:190), Intonational Phrases (I-phrases) are isomorphic with syntactic constituents that are obligatorily parsed as I-phrases. Suppose the same were true for obligatory Intermediate Phrases. Then, the left periphery of a fully propositional embedded TP (an obligatorily parsed intP in the language) must be aligned with the left periphery of INTP in Nupe. This is illustrated graphically below.

- (33) Syntactic structure: ... V [_{CP} C [_{TP} ...
Prosodic structure:] [_{INTP} ...

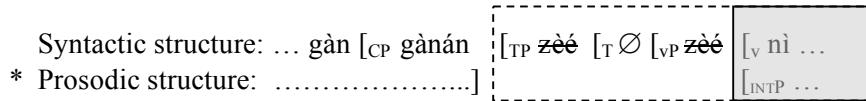
Given that I-phrase/INTP phrasing must occur at the juncture between two prosodic words (Nespov and Vogel 1986, Schütze 1994), INTP will fail to align with TP if the edge of TP is phonetically unrealized because in that case its periphery would lack a prosodic word and thus fail to constitute a potential boundary site. Again, we understand “edge” in the Minimalist (syntactic) sense of the word (Chomsky 2001, 2005): given a projection ZP, the edge positions of ZP include ZP’s daughters (adjunct(s) and specifier(s)) and Z⁰ (the projecting head). Given this, we can understand C-t effects in Nupe as cases where an INTP and an embedded T-projection fail to align as a consequence of the fact that the TP edge is phonetically unrealized when the subject occurrence is displaced and its copy is deleted at PF. When the TP edge is phonetically unrealized, the first prosodic word encountered in the parse of the embedded TP will be a verbal element residing in v⁰. In this case, INTP will align with the v-projection, a syntactic phrase that is *not* obligatorily parsed as an INTP in the language. The ensuing syntactic-prosodic mismatch triggers the judgment of ungrammaticality commonly referred to as a *Comp-trace* effect. This is schematized in (34) below.

- (34) a. PROSODICALLY WELL-FORMED (cf. (28a)) [C-t mitigation by TP modification/adjunction]
Syntactic structure: ... gán [_{CP} gánán [_{TP} pányi lèé [_{TP} zéé [T ...
√ Prosodic structure:] [_{INTP} ...]
- b. PROSODICALLY WELL-FORMED (cf. (29b)) [C-t mitigation by subject resumption]
Syntactic structure: ... gán [_{CP} gánán [_{TP} u: [T...
√ Prosodic structure:] [_{INTP} ...]

c. PROSODICALLY WELL-FORMED (cf. (30a)) [C-t mitigation by spelling out T⁰]



d. PROSODICALLY ILL-FORMED (cf. (25e)) [∅ TP modifier, ∅ PF subject, ∅ T⁰]



Stepping back, a broader generalization relating to the syntax-phonology interface can be surmised. Namely, the edge domain of an obligatorily parsed prosodic phrase must be phonetically realized. This observation was first made for I-phrases by Duk-Ho An (2007a), who gave it the name “Intonational Phrase Edge Generalization” (IPEG)¹⁰.

(35) INTONATIONAL PHRASE EDGE GENERALIZATION (An 2007a)

The edge of an obligatorily parsed Intonational phrase cannot be phonetically empty.

Nupe C-t effects thus reduce to violations of the IPEG. Because embedded reduced complementizers (e.g. *ʔán* (27)) do not mark the right boundaries of Intermediate Phrases in Nupe (as mentioned at the outset of this section), extraction of embedded subjects across such complementizers will never trigger an IPEG violation. Hence, we derive the obviation of *Comp-trace* effects by C⁰ reduction (cf. (27)). Furthermore, relative clause complementizers in the language (e.g. *na* (24g)) mark the *left* edge of INTP in Nupe, unlike the other complementizers in the language. For this reason, subject extraction across a relative C⁰ will never incur a violation of the IPEG: regardless of the PF realization of the relative TP following the complementizer, the edge of the relative INTP will always be phonetically realized by the relative complementizer (whose omission is illicit). For this reason, relativization of non-embedded subjects (cf. (24g), repeated below as (36)) does not engender a *Comp-trace* effect in the language.

(36) Bagi na ___ ba nakàn na
 man REL cut meat REL
 ‘The man that cut the meat’

3.3 Summary of Case Study 2

Nupe C-t effects represent instances of phono-syntactic edge sensitivity and as such, fall under the rubric of phenomena attributable to syntax-phonology interactions. The key insight into this interface that comes at the hands of studying Nupe C-t effects is that at the level of prosodic mapping (i.e. at PF), the (left) “edge” of a prosodic domain is defined/referenced in syntactic terms. Consequently then, at both the levels of narrow syntactic computation and its interface with phonology, appeal to the Minimalist notion of edge is necessary. In this way, we once again find support for the inclusion of edges into our syntactic ontology.

¹⁰ A revised and generalized version of IPEG appears in An 2007b as BONE (“Ban on Null Edge” generalization). BONE extends IPEG’s jurisdiction to both the left and right edges of obligatorily parsed I-phrases.

4. Conclusion

We have seen support for edges in both the narrow syntax and at the syntax-phonology interface in the grammar of Nupe. Enriching the Minimalist technology with edges provided new tools to wield in the analysis of two previously unsolved and unrelated extraction restrictions in the language.

The restriction on extraction from perfect domains was shown to reduce to a PIC effect and thus to a narrow syntactic source. By their very nature, appeals to the PIC require an edge-inclusive ontology. The innovation in our analysis, however, was to appeal to the concept of Edge Features as well. In particular, we proposed that the Edge Features of phase heads, which drive movement to specifier (i.e. phase edge) positions, are inherently dormant features that require activation by means of Agree. We were able to use these tools to develop a solution to the Nupe perfect extraction restriction that is at once both descriptively and explanatorily satisfying.

The restriction on long subject extraction across a complementizer, a type of *Comp-trace* effect, was shown to reduce to a principle of well formedness governing prosodic mapping (IPEG) that is sensitive to both syntactic and phonological (prosodic) structure. In this regard, Nupe *Comp-trace* effects reflect grammatical impropriety at the level of the syntax-phonology interface. The crucial insight into Nupe *Comp-trace* effects is that this principle of prosodic well formedness references both the specifier and the head positions of a given analyzed unit. Therefore, in much the same way that the specifier and head of a phase are given privileged status under the PIC, so too are specifier and head privileged in the eyes of IPEG.

Insofar as EDGE unifies both specifier and head positions into a single grammatical domain, the two case studies presented in this article provide strong empirical endorsement for the inclusion of edges into the Minimalist apparatus. Conceptually speaking as well, the addition of edges is supported by the observation that the new paradigm offers solutions to problems where there were none before. On the force of these considerations, then, we conclude that in addition to phonologists and morphologists, syntacticians too should embrace edges as pivotal grammatical domains.

References

- Aoun, Josef, Norbert Hornstein, David Lightfoot, and Amy Weinberg. 1987. Two Types of Locality. *Linguistic Inquiry* 18: 537-577.
- An, Duk-Ho. 2007a. Clauses in Noncanonical Positions in PF. *Syntax* 10:38-79.
- An, Duk-Ho. 2007b. *Syntax at the PF Interface: Prosodic Mapping, Linear Order, and Deletion*. Ph.d. dissertation, University of Connecticut.
- Baker, Mark C. 2003. *Lexical Categories: Verbs, Nouns, and Adjectives*. Cambridge: Cambridge University Press.
- Baker, Mark C. and Chris Collins. 2006. Linkers and vP Structure. *Natural Language and Linguistic Theory* 24: 307-354.
- Bayer, Josef. 1984. Comp in Bavarian Syntax. *Linguistic Review* 3: 209-274.
- Bennis, Hans. 1980. Coindexing and *Complementizer Trace* Phenomena. Paper presented at the 1980 GLOW conference, Nijmegen.
- Borer, Hagit. 1984. *Parametric Syntax*. Dordrecht: Foris.
- Bowers, John. 1993. The Syntax of Predication. *Linguistic Inquiry* 24: 591-656.
- Chomsky, Noam. 1981. *Lectures on Government and Binding*. Dordrecht: Foris.
- Chomsky, Noam. 1986. *Barriers*. Cambridge, MA: MIT Press.
- Chomsky, Noam. 2000. Minimalist Inquiries. In Roger Martin, David Michaels, and Juan Uriagereka (eds.), *Step by Step: Essays on Minimalism in Honor of Howard Lasnik*, 89-155. Cambridge, MA: MIT Press.
- Chomsky, Noam. 2001. Derivation by Phase. In Michael Kenstowicz (ed.), *Ken Hale: A Life in Language*, 1-52. Cambridge, MA: MIT Press.

- Chomsky, Noam. 2005. On Phases. To appear in C.P. Otero et. al., (eds.), *Foundational Issues in Linguistic Theory*. Cambridge, MA: MIT Press.
- Chomsky, Noam. 2006. Approaching UG from Below. Ms. MIT.
- Chomsky, Noam & Howard Lasnik. 1977. Filters and Control. *Linguistic Inquiry* 8: 425-504.
- Culicover, Peter. 1993a. Evidence Against ECP Accounts of *That-t* Effect. *Linguistic Inquiry* 24: 557-561.
- Culicover, Peter. 1993b. Focus and Grammar. In Peter Ackema and Maaiki Schoorlemmer (eds.), *Proceedings of the Workshop on the Semantic and Syntactic Analysis of Focus*, 1-19. OTS Working Papers, Research Institute for Language and Speech, Utrecht University.
- de Chene, Brent. 1995. *Complementizer-trace* Effects and the ECP. *Geneva Generative Papers* 3.1:1-4. Département de Linguistique Générale, Université de Genève.
- de Chene, Brent. 2000. Prosody and Subject Traces. Ms. Waseda University.
- de Chene, Brent. 2001. Prosody and Trace-Licensing: *Complementizer-trace* Effects and Beyond. Poster presented at the Workshop on Prosody in Processing. Utrecht University, OTS. July 6.
- Deprez, Viviane. 1994. A Minimal Account of the *That-t* Effect. In Guglielmo Cinque, Jan Koster, Jean-Yves Pollock, Luigi Rizzi, and Raffaella Zanuttini (eds.), *Paths Towards Universal Grammar. Studies in Honor of Richard S. Kayne*, 121-135. Washington, D.C: Georgetown University Press.
- Dikken, Marcel den. 2006a. A Reappraisal of vP Being Phasal – A Reply to Legate. To appear in *Theoretical Linguistics*.
- Dikken, Marcel den. 2006b. *Relators and Linkers: The Syntax of Predication, Predicate Inversion, and Copulas*. Cambridge, MA: MIT Press.
- Dikken, Marcel den. 2007. Phase Extension: A Reply. To appear in *Theoretical Linguistics*.
- Gallego, Ángel. 2006. Phase Sliding. Ms. Universitat Autònoma de Barcelona. (Presented at WCCFL 25.)
- Gallego, Ángel and Juan Uriagereka. 2006. Sub-Extraction from Subjects: A Phase Theory Account. Ms. Universitat Autònoma de Barcelona and University of Maryland, College Park. (Presented at WCCFL 25.)
- Gathercole, Virginia C. and Cecilia Montes. 1997. *That-trace* Effects in Spanish- and English- speaking Monolinguals and Bilinguals. In Ana Teresa Pérez-Leroux and William R. Glass (eds.), *Contemporary Perspectives on the Acquisition of Spanish, Volume 1: Developing Grammars*, 75-95. Somerville, MA: Cascadilla Press.
- Giorgi, Alessandra and Fabio Pianesi. 1997. *Tense and Aspect: From Semantics to Morphosyntax*. Oxford: Oxford University Press.
- Guest, Haley. 2001. *The CTP and the Effect of ‘Appropriately’ Placed Adverbs in British English*. Baccalaureate dissertation, University of Wales, Bangor.
- Haegeman, Liliane. 1992. *Theory and Description in Generative Syntax: A Case Study of West Flemish*. Cambridge: Cambridge University Press.
- Hoge, Kerstin. 2001. *That-t* Effects in English and Yiddish. In Galina M. Alexandrova and Olga Arnaudova (eds.), *The Minimalist Parameter*, 233-248. Amsterdam: John Benjamins.
- Holmberg, Anders. 1986. *Word Order and Syntactic Features in the Scandinavian Languages and English*. Ph.D. dissertation, University of Stockholm.
- Holmberg, Anders. 1999. Remarks on Holmberg’s Generalization. *Studia Linguistica* 53: 1-39.
- Ishii, Toru. 2004. The Phase Impenetrability Condition, the Vacuous Movement Hypothesis, and *That-t* Effect. *Lingua* 114: 183-215.
- Kandybowicz, Jason. 2006. *Conditions on Multiple Copy Spell-Out and the Syntax-Phonology Interface*. Ph.D dissertation, UCLA.
- Kandybowicz, Jason and Mark C. Baker. 2003. On Directionality and the Structure of the Verb Phrase: Evidence from Nupe. *Syntax* 6: 115-155.
- Kawu, Ahmadu Ndanusa. 1990. Some Instances of Sentential Complementation in Nupe. Master’s thesis, University of Ibadan.
- Kayne, Richard. 1981. ECP Extensions. *Linguistic Inquiry* 12: 93-133.

- Koizumi, Masatoshi. 1995. *Phrase Structure in Minimalist Syntax*. Ph.D. dissertation, MIT.
- Koopman, Hilda. 1984. *The Syntax of Verbs*. Dordrecht: Foris.
- Legate, Julie Anne. 2003. Some Interface Properties of the Phase. *Linguistic Inquiry* 34: 506-516.
- Maling, Joan and Annie Zaenen. 1978. The Non-Universality of a Surface Filter. *Linguistic Inquiry* 9: 475-497.
- Merchant, Jason. 2001. *The Syntax of Silence: Sluicing, Islands, and the Theory of Ellipsis*. Oxford: Oxford University Press.
- Merchant, Jason. To appear. Variable Island Repair Under Ellipsis. In Kyle Johnson (ed.), *Topics in Ellipsis*. Cambridge: Cambridge University Press.
- McDaniel, Dana, Bonnie Chiu, and Thomas Maxfield. 1995. Parameters for *wh*- Movement Types: Evidence from Child Language. *Natural Language and Linguistic Theory* 13: 709-753.
- Moens, Marc. 1987. *Tense, Aspect, and Temporal Reference*. Ph.D. dissertation, University of Edinburgh.
- Nespor, Marina and Irene Vogel. 1986. *Prosodic Phonology*. Dordrecht: Foris.
- Parsons, Terrence. 1990. *Events in the Semantics of English*. Cambridge, MA: MIT Press.
- Perlmutter, David. 1971. *Deep and Surface Structure Constraints in Syntax*. New York: Holt, Rinehart, and Winston.
- Pesetsky, David. 1982. Complementizer-trace Phenomena and the Nominative Island Condition. *The Linguistic Review* 1: 297-343.
- Pesetsky, David and Esther Torrego. 2001. T-to-C Movement: Causes and Consequences. In Michael Kenstowicz (ed.), *Ken Hale: A Life in Language*, 355-426. Cambridge, MA: MIT Press.
- Reuland, Eric. 1983. Movement Versus Merger: Relations between Inflection and Verb. Paper presented at the 13th meeting of the Northeast Linguistics Society, Université du Québec à Montréal.
- Richards, Norvin. 1999. Pied-piping and Islands: the *That*-trace Effect. *GLOW 40 Newsletter*: 44-45.
- Rizzi, Luigi. 1990. *Relativized Minimality*. Cambridge, MA: MIT Press.
- Rizzi, Luigi. 2004. On the Form of Chains: Criterial Positions and ECP Effects. Ms. University of Siena.
- Roussou, Anna. 2002. C, T, and the Subject: *That-t* Phenomena Revisited. *Lingua* 112: 13-52.
- Schütze, Carson. 1994. Serbo-Croatian Second Position Clitic Placement and the Phonology-Syntax Interface. In Andrew Carnie, Heidi Harley, and Tony Bures (eds.), *Papers in Phonology and Morphology*, 373-473. MIT Working Papers in Linguistics 21. Cambridge, MA: MITWPL.
- Shlonsky, Ur. 1988. Complementizer-cliticization in Hebrew and the Empty Category Principle. *Natural Language and Linguistic Theory* 6:191-205.
- Smith, Neil V. 1967. *An Outline Grammar of Nupe*. London: Luzac.
- Sobin, Nicholas. 1987. The Variable Status of *Comp*-trace Phenomena. *Natural Language and Linguistic Theory* 5: 33-60.
- Stahlke, Herbert. 1970. Serial Verbs. *Studies in African Linguistics* 1: 60-99.
- Steedman, Mark. 1994. Temporality. In Johan van Benthem and Alice ter Meulen (eds.), *Handbook of Logic and Language*. Amsterdam: Elsevier Science BV.
- Szczegieliński, Adam. 1999. ‘*That-t* Effects’ Crosslinguistically and Successive Cyclic Movement. In Karlos Arregi, Benjamin Bruening, Cornelia Krause, and Vivian Lin (eds.), *Papers on Morphology and Syntax, Cycle One*, 369-393. Cambridge, MA: MITWPL.
- Thornton, Rosalind. 1990. *Adventures in Long-distance Moving: the Acquisition of wh- Questions*. Ph.D. dissertation, University of Connecticut.
- Travis, Lisa de Mena. 1991. Derived Objects, Inner Aspect, and the Structure of VP. Paper presented at NELS 22, Newark, DE.