TONOSYNTAX AND REFERENCE RESTRICTION IN DOGON NPS

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Lexical tone melodies of words and word strings in Dogon languages are overridden by syntactically conditioned word-level or broader tone overlays. In Ben Tey and other Dogon languages, certain NP-internal elements—possessors, adjectives, relative clauses, demonstratives—are controllers, imposing overlays such as {L} and {HL} on adjacent words or word strings (the targets). Other elements (nonsingular quantifiers, discourse-functional morphemes) do not control overlays. The semantic generalization is that reference restrictors are controllers, while non-reference restrictors are not. Tonosyntactic processes have access to input stem-class categories and semantic/pragmatic groupings thereof, input phonological features (tone of the adjacent edge of the controllers), prosodic weight of the target, and, with possible minor exceptions, linear adjacency. Such operations can only be accounted for in a model of grammar with an enriched syntax-phonology interface.*

Keywords: tonosyntax, Dogon languages, NP, reference restriction

1. INTRODUCTION.

1.1. TONOSYNTAX. We define TONOSYNTAX as a productive system whereby words or phrases of particular syntactic categories (e.g. adjective, possessor NP) systematically impose TONE OVERLAYS on other words or word strings. We call the former (tonosyntactic) CONTROLLERS and the latter (tonosyntactic) TARGETS. Such overlays often extend over more than one word. Lexical tone melodies of targets are disregarded in the choice of tone overlays and are erased (overridden, overwritten) by them. Overlays (enclosed in curly brackets) that are attested in Dogon NPs are {L}, {HL}, {LH}, and {H}.[1] Lexical melodies (enclosed in slashes) that they erase include /H/, /HL/, /LH/, /LHL/, and rarely /HLH/ for uncompounded stems. For example, lexically /LH/-toned Ben Tey *nă:* 'cow(s)' has {L} overlay (i.e. tone-lowering) in *nà:* before an adjective, and {HL} overlay in *nâ:* after some types of possessor.

In Dogon languages, tone overlays also occur in verb derivation and inflection, compounding, and occasionally in clausal subordination (purposive clauses). This article deals only with NP-internal tonosyntactic processes and focuses on their ontology, that is, the nature of the input elements that trigger them, and the general form of the processes themselves. Details of phonological implementation that reflect regular tonal phonology are disregarded here where possible, as is the resolution of conflicts among potentially competing controllers. Descriptively, we show that controllers and noncontrollers correlate with distinct sets of stem classes (e.g. adjective versus numeral). We theorize that controllers are the set of stem classes that restrict reference, in a particular sense described in §5.

Aside from the fact that overlays are expressed phonologically, as tonal patterns, the input phonological form of the controller or the target can affect which of two possible

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[1] An {LHL} overlay that is attested in a few Dogon languages can be decomposed into {LH} plus a separate L-tone appended at the right edge.

overlays, such as {L} versus {HL}, is applied to the target. This is not reducible to productive phonological rules, as we show in §§7.1–7.2. Likewise, a fairly strong case can be made that controllers and their targets must be string-adjacent at the point when the operations take place; see §7.3. Therefore semantics, syntax, and phonology are tightly integrated in tonosyntactic operations, and we would be remiss in slighting any one of these modules.

Tonosyntax differs from other grammatical tone phenomena because its tone overlays completely disregard lexical tone melodies, because the overlays can extend over more than one word, and because of its overall syntactic-semantic systematicity. A few comparisons with other African languages may make this clear.

In Ngizim (Schuh 1972:11, 51), an /L/-toned noun like *tə̀kà* 'body' raises its final vowel to H-tone before an associative linker *k* ~ *g* ~ *gə́* and a following noun, as in *tə̀ká-g dùùkà* 'the horse's body'. The linker is optionally omitted, leaving behind only the tone change on the final syllable. We can therefore posit a fourth variant, namely a floating H-tone (cf. the H-tone in the syllabic allomorph *gə́*), which then docks to the left. If the three segmental variants of the associative linker disappear in the future, we will have a pure tonal morpheme of the type very common in African languages.

This appears to have happened in Etsako (Elimelech 1976:56–57). In this language, however, relevant tonal changes can affect all syllables of a noun stem. For example, /L/-toned *àmɛ̀* 'water' surfaces with an H-toned melody in associative combinations like *ámɛ́-èθà* 'father's water'. However, this is still not a true {H} overlay of the Dogon sort, as shown by lexically /LH/-toned *ɔ̀tɛ́* 'cricket', which remains rising-toned in *ɔ̀tɛ́-èθà* 'father's cricket'. The correct analysis of the Etsako associative construction is therefore /N_1 H N_2/. The linker consists of an H-tone that docks to the left, as in Ngizim. It can then spread over an L-toned domain to the onset of N_1, but not beyond a lexical H-tone.

Some other types of multiword tonal patterning are more clearly distinct from Dogon-style tonosyntax. For example, in Kikuria an H-spreading process may extend beyond the final syllable of a verb into a following toneless noun (Marlo & Mwita 2009, cited in Hyman 2012:27–28). Hyman's description of this as 'phrasal morphology' is apt, and we see little connection between this and tonosyntax.

'Replacive tone' (Welmers 1973:132–33) comes closer to our notion of tonosyntactic overlay, insofar as a lexical tone melody is disregarded and erased. This term is applied to processes affecting stems, typically in verb derivation (e.g. causative, passive) and inflection (e.g. past tense). Replacive tone of this type is akin to, but not fully synonymous with, tonosyntactic overlays. There may or may not be an overt external controller, and various replacive tones in a language may be associated in ad hoc ways with specific grammatical categories, rather than reflecting a general principle. We regard such cases as (tono)morphological rather than as (tono)syntactic. The term replacive tone is arguably unsuitable for generalized use since it presupposes that there is a lexical tone to replace, whereas tone overlays can apply to stems whether or not they have lexical tone melodies. In some Dogon languages, verbs have no lexical tones and therefore always acquire their surface tones from overlays.

Some languages that do have something like Dogon tonosyntax are noted in §5.2 below, since the comparisons will make more sense once we have outlined the Dogon system.

1.2. Implications for modular interfaces. After presenting the data and arguing that semantic, syntactic, and to some extent phonological elements are intrinsic components of Dogon NP tonosyntax, in §8.2 we consider two models of interfaces between

syntax/morphology and phonology. One is prosodic hierarchy theory (Selkirk 1984), which emphasizes the importance of the edges of multiword syntactic phrases in phonological processes, while claiming that specific categorial labels like noun, numeral, and NP are disregarded. The other is construction morphology (Booij 2010), which allows recognition of categorial labels in both targets and external controllers (in our terminology), but has normally been applied only at the word level. We argue that Dogon NP tonosyntax requires the multiword scope of prosodic hierarchy theory, but also the recognition of categorial labels as in construction morphology. In other words, we argue for a considerable enrichment of current versions of the syntax-phonology interface.

1.3. DOGON LANGUAGES. This is a family of some eighty locally named varieties that have been tentatively grouped by linguists into some twenty languages. The villages are located on elevated plateaus, cliffsides, and low sandy plains in eastern Mali, West Africa.[2]

The authors have done fieldwork on numerous Dogon languages from 2005 to the present. The analysis presented here is broadly valid, mutatis mutandis, for most Dogon languages, including Ben Tey, Nanga, Bankan Tey, Toro Tegu, Jamsay, Tommo So, Najamba, Togo Kan (and related varieties), and Yorno So (and the rest of 'Toro So').[3] Recent published grammars are Heath 2008 on Jamsay and McPherson 2013 on Tommo So. Draft reference grammars, ranging from complete to fragmentary, on several other Dogon languages, including Ben Tey, are available at http://www.dogonlanguages.org.[4]

To make the exposition and examples easier to follow, §§2–5 feature Ben Tey. This language was chosen because it is representative of mainstream Dogon, and because its tonosyntactic and morphological systems allow us to make our theoretically central points. Ben Tey is spoken in the village of Beni south of Douentza; a grammar and texts are available on the website indicated above. We cite data from other languages especially in §6, which deals with elements whose tonosyntactic treatment is variable across Dogon languages.

Ben Tey clauses are verb-final. Verbs are suffixally inflected for aspect, mood (indicative, imperative, hortative), and negation, followed (in main clauses) by pronominal-subject agreement suffixes. Verbs can be followed only by emphatic or interrogative particles or, if subordinated, by clause-linking elements. A sample sentence from Ben Tey is given in 1.[5]

(1) hà: bàrá: [î: mà:] ɛ̌: gànjù-bɔ́
well Bara [1PL DAT] well(N) dig.PRF-3PL.SUBJ
'Well, they dug a well for us at Bara.' (Ben Tey)

One further preliminary point is worth making. In Ben Tey and the other languages in our sample, open-class stems (noun, adjective, numeral, verb) must have at least one

[2] A genetic position as a branch of Niger-Congo is widely assumed, but no close relationships to specific other branches have yet been established.

[3] Yanda Dom, Tebul Ure, and Tiranige have somewhat similar systems but some important differences. Donno So, Dogulu, and Tomo Kan are currently under study by colleagues. A western Dogon subgroup including Mombo, Ampari, Bunoge, and Penange has a more divergent NP tonosyntax and requires separate treatment; see Prokhorov 2011 on NP tonosyntax in Mombo.

[4] Earlier published grammars—Plungian 1995 on Tommo So, and three French missionary grammars including Prost 1969 on Togo Kan—are valuable on other points but do not mark tones or analyze tone systems.

[5] Nonobvious abbreviations used in the glosses as are follows: ACC: accusative, AN.SG: animate singular, AN.PL: animate plural, ASSOC: associative, DAT: dative, DEF: definite, DEM: demonstrative, HUM: human, IMPF: imperfective, INAN: inanimate, MEDPASS: mediopassive, OBJ: object, POSS: possessive, PPL: participial, PRF: perfective, PROG: progressive, PROX: proximal, RDP: reduplicant, REFL: reflexive, SUBJ: subject, TOP: topic.

lexical H-tone. Using /…/ to enclose lexical tones, stems may be lexically /H/, /LH/, /HL/, /LHL/, or (rarely) /HLH/, but (using # for ungrammatical) not #/L/. A consequence of this is that the most common overlay {L}—that is, stem-wide tone-lowering—is always overt (audible). For example, the Ben Tey noun *ɛ̌ː* 'well' is lexically /LH/, so its tone-lowered form *ɛ̀ː*^{L} (as in *ɛ̀ː*^{L} *díyⁿà-wⁿ* 'a big well') and its {HL}-toned possessed form ^{HL}*ɛ̂ː* (as in *yǎ-m* ^{HL}*ɛ̂ː* 'a woman's well') are easily recognized. (Superscripts like ^{L} and ^{HL} are optional indices of the operation of tone overlays and are placed at the edge facing the controller; they are not phonetic diacritics.)

2. Structure of NPs excluding tones. We speak of NPs without taking a position on whether nominal arguments are noun-headed (NP) or determiner-headed (DP). Ben Tey NPs have the linear structure in 2, omitting relative clauses. The important point is that the noun is followed by all modifiers except possessors. For the single-morpheme categories, viz., definite, plural, and 'all', the actual Ben Tey form is shown under the label in the middle row. The sections where these categories are discussed are given in the bottom row.[6]

(2) Poss	noun	Adj(s)	Num	Dem	Def	Pl	'all'	DF
					kù	*bè*	*(dàⁿ-)wôy*	
§4.2	—	§4.1	§3.1	§4.1	§6.3	§3.3	§3.2	§3.4

Ben Tey suffixal categories are animate singular, animate plural, and inanimate (an.sg, an.pl, inan). In the absence of an adjective, the only overt suffix on the noun is an.sg *-m*. Even this suffix is normally omitted on kin-term nouns. If an adjective is present, the noun is bare and one of three nonzero suffixes is added to the adjective; see Table 1. The absence of an.sg *-m* before an adjective is cited in §4.1 below to support an analysis of internally headed relative clauses.

	animate sg	animate pl	inanimate
after alienable N	-m	ø	ø
after kin term	ø	ø	ø
after N Adj	-m	-yɛ̀	-w

Table 1. Ben Tey nominal/adjectival suffixes.

For example, animate 'cow' is singular *nǎː-m* or plural *nǎː*, while kin term *nàrⁿá* 'mother(s)' and inanimate *kúrⁿù* 'stone(s)' can be singular or plural (independent plural particle *bè* can specify plurality if needed). Adding the adjective *bárⁿà-* 'red (including brown)', we get *nàː*^{L} *bárⁿà-m* 'brown cow' and its plural *nàː*^{L} *bárⁿà-yɛ̀* 'brown cows', *nàrⁿà bárⁿà-m* 'brown(-skinned) mother' and its plural *nàrⁿà bárⁿà-yɛ̀* 'brown(-skinned) mothers', and *kùrùL bárⁿà-wⁿ* 'red/brown stone(s)' (*-wⁿ* is nasalized from *-w*). The suffixes are atonal (*-m*, *-w*) or L-toned (*-yɛ̀*), and since the only tone overlays that can affect adjectives are L-final, these suffixal tones can be disregarded for our purposes.

We now identify the NP-internal modifiers and determine which do not (§3) and which do (§4) control tone overlays. This parallel inventory will put us in a position to theorize about the semantic basis of tonosyntactic control in §5. Our theory is further tested in §6 by examining borderline elements whose control behavior is variable across Dogon languages.

[6] Poss[essor], N[oun], Adj[ective], Num[eral], Dem[onstrative], Def[inite], Pl[ural], and DF = discourse-function (topic marker, 'only', 'too')

3. INVENTORY OF TONOSYNTACTIC NONCONTROLLERS. The modifiers that do not control tones are numerals greater than 'one', other nonsingular quantifiers ('all', the independent plural particle), and discourse-function (DF) markers. These elements do not control overlays on preceding strings such as noun or N-Adj, nor are they tonosyntactically targeted by these preceding strings.[7]

3.1. NONSINGULAR NUMERALS. Numerals from 'two' up do not interact tonosyntactically with preceding nouns or N-Adj combinations. The numeral and the preceding word(s) have the same tones they would have in isolation. In 3a,b, the form of the noun or N-Adj sequence without the numeral is given in parentheses.

(3) a. kúrⁿù tà:nú
stone three
'three stones' (*kúrⁿù*) (Ben Tey)

b. ùròᴸ díyⁿà-wⁿ kúròy (kù)
houseᴸ big-INAN six (DEF)
'(the) six big houses' (*ùròᴸ díyⁿà-wⁿ*) (Ben Tey)

3.2. 'ALL' QUANTIFIER. The universal quantifier in Ben Tey is *dàⁿ-wôy* or a variant thereof (*wôy*, *dò-wôy*, *dɛ̀ⁿ-wôy*). It translates as 'all', and it combines with nominal expressions denoting plurals and masses. It can be followed within the NP only by DF markers, and this combination is rare. *dàⁿ-wôy* has no tonosyntactic interaction with any other NP-internal words. Examples are given in 4a–c.

(4) a. kúrⁿù (kù) dàⁿ-wôy
stone (DEF) all
'all (the) stones' (*kúrⁿù* or definite *kúrⁿù kù*) (Ben Tey)

b. kùrⁿùᴸ bárⁿà-wⁿ dàⁿ-wôy
stoneᴸ red-INAN all
'all (the) red/brown stones' (*kùrⁿùᴸ bárⁿà-wⁿ*) (Ben Tey)

c. púlɔ̌: dàⁿ-wôy
Fulbe.AN.PL all
'all (the) Fulbe (people)' (*púlɔ̌:*) (Ben Tey)

3.3. INDEPENDENT PLURAL PARTICLE. The Ben Tey independent (nonsuffixal) plural morpheme *bè* occurs late in the NP, following even definite *kù*. It is common after animate nouns that do not suffixally distinguish singular from plural (kin terms, names), and it is optionally used as the only plural marking possible for inanimates. There is no tonal interaction between *bè* and preceding elements within the NP. Examples with *bè* are given in 5.

(5) a. kùrⁿùᴸ bárⁿà-wⁿ bè
stoneᴸ red-INAN PL
'(the) red/brown stones' (*kùrⁿùᴸ bárⁿà-wⁿ*) (Ben Tey)

b. tìyé bè
cousin PL
'cousins' (*tìyé*) (Ben Tey)

3.4. DISCOURSE-FUNCTION MARKERS. We use this as a term of art for various NP-final particles that do not directly affect the denotation of the NP. The principal ones in Ben

[7] While numerals are never targeted by preceding nouns or adjectives, they may be part of noun-headed strings like N(-Adj)-Num that can be targeted by a preceding possessor, as in Poss-N(-Adj)-Num, or by a following controller such as a demonstrative, as in N(-Adj)-Num-Dem.

Tey are the topic marker *kày*, *sǎy* 'only', and *kálà* 'also; even'. These elements do not interact tonosyntactically with preceding words within the NP. Examples are given in 6.

(6) a. kúr^{n}ù kày
stone TOP
'as for a stone/stones' (*kùr^{n}ù*) (Ben Tey)

b. nă: sǎy
cow.AN.PL only
'only cows' (*nă:*) (Ben Tey)

c. púlǔ: kálà
Fulbe.AN.PL also/even
'also/even Fulbe (people)' (*púlǔ:*) (Ben Tey)

3.5. SUMMARY OF §3. Nonsingular quantifiers (numerals from 'two' up, 'all', and plural) and DF markers systematically fail to control tone overlays on other words within the NP. This is true not only for Ben Tey but also for nearly all other Dogon languages. There is no semantic common thread unifying this combination, especially since DF marking is already a heterogeneous category. Nor is it the case that the various noncontrollers form a contiguous string of elements within NPs; as indicated in 2, numerals can be separated from the other noncontrollers by intervening demonstratives, which do control tone overlays. We argue in §5 below that noncontrollers are defined negatively as the residue after reference restrictors are separated out.

4. INVENTORY OF TONOSYNTACTIC CONTROLLERS. The NP modifiers that do control tone overlays on other NP-internal words, in Ben Tey and widely in other Dogon languages, are modifying adjectives, demonstratives, relative clauses, and possessors. All of them target nouns and may also target words intervening between them and the noun. Most controllers work right to left, but possessors (which precede the noun) work left to right, so we discuss them last (§4.2).

4.1. RIGHT-TO-LEFT CONTROL. Modifying adjectives, demonstratives, and (in our analysis) relative clauses are right-to-left (R-TO-L) controllers; that is, they follow the word(s) they target. R-to-L controllers always control {L} (tone-lowering) in Ben Tey, as in most other Dogon languages.

MODIFYING ADJECTIVES. Modifying (attributive) adjectives directly follow nouns. In this combination, the adjective controls {L} on the noun, hence [N^{L} Adj], where the superscript represents the tone overlay. Examples are 4b and 5a above with tone-lowered *kùr^{n}ù*^{L} from lexical *kúr^{n}ù* 'stone'; see also 3b with *ùrò*^{L} from *úrò* 'house'. A second adjective may be added, in which case both the noun and the first adjective are tone-lowered, hence [N^{L} Adj$_1$^{L} Adj$_2$].[8] The order of adjectives is free unless one of them is colexicalized with the noun. In all cases, only the final word is tonally free. Examples of [N^{L} Adj$_1$^{L} Adj$_2$] are 7c,d; compare 7a and 7b with just one of the adjectives. The noun is *màŋgórò* with lexical /LHL/ melody.

(7) a. màŋgòrò^{L} dùgû-w
mango^{L} big-INAN
'big mango(es)' (Ben Tey)

[8] It is indeterminate whether N-Adj$_1$-Adj$_2$ tone-lowering is cyclical (two step), that is, [[N^{L} Adj$_1$]^{L} Adj$_2$] with the first adjective targeting the noun on a lower cycle, or one step, that is, [[N Adj$_1$]^{L} Adj$_2$].

b. màŋgòrò^{L} bár^{n}à-w^{n}
mango^{L} red-INAN
'red (i.e. ripe) mango(es)' (Ben Tey)

c. màŋgòrò^{L} dùgù-w^{L} bár^{n}à-w^{n}
mango^{L} big-INAN^{L} red-INAN
'big red (i.e. ripe) mango(es)' (Ben Tey)

d. màŋgòrò^{L} bàr^{n}à-w$^{n^{L}}$ dùgû-w
mango^{L} red-INAN^{L} big-INAN [= 7c]

DEMONSTRATIVES. Ben Tey has several demonstrative determiners ('this', 'that') distinguishing deictic category (proximal, near-distant, far-distant) and animacy. Plurality is marked by adding the particle *bè* (optional for inanimates). The proximal ('this', 'these') and near-distant ('that', 'those', for example, near the addressee) demonstrative paradigms are given in Table 2.

	ANIMATE SG	ANIMATE PL	INANIMATE SG	INANIMATE PL
PROXIMAL	mǔ:	mǔ: bè	ŋ̀gú	ŋ̀gú bè
NEAR-DISTANT	-m kú	-m kú bè	kú	kú bè

TABLE 2. Ben Tey proximal and near-distant demonstratives.

Demonstratives can occur absolutely (independently), that is, as self-standing NP arguments, or they can modify a preceding noun, N-Adj, N-Num, or N-Adj-Num string. As modifiers, all demonstratives control {L} on the preceding string. For example, N-Num-Dem appears as [N^{L} Num^{L} Dem]. Proximal inanimate *ŋ̀gú* is added to a noun in 8a, to N-Adj in 8b, and to N-Num in 8c.[9]

(8) a. kùr^{n}ù^{L} ŋ̀gú
stone^{L} PROX.INAN
'this stone' *or* 'these stones' (*kúr^{n}ù*) (Ben Tey)

b. kùr^{n}ù^{L} bàr^{n}à-w$^{n^{L}}$ ŋ̀gú bè
stone^{L} red-INAN^{L} PROX.INAN PL
'these red stones' (*kùr^{n}ù^{L} bár^{n}à-w^{n}*) (Ben Tey)

c. ùrò^{L} kùròy^{L} ŋ̀gú
house^{L} six^{L} PROX.INAN
'these six houses' (*úrò kúròy*) (Ben Tey)

INTERNALLY HEADED RELATIVE CONSTRUCTIONS. Relatives in Ben Tey and most other Dogon languages are internally headed (better: circumnominal) and semantically restrictive rather than parenthetical (*John, whom I detest, ...*). Dogon relatives were first analyzed by Culy (e.g. 1990), who did not, however, transcribe or discuss tones.

The clause containing the internal head functions as an NP in the higher clause, like an English NP that consists of an external head plus a subordinated relative clause. Only the core of the head NP, maximally Poss-N-Adj-Num, occurs inside the relative clause. Importantly, this internal head is tone-lowered to {L}. It is optionally followed by relative marker *kà:^{n}*. The remaining modifiers (determiners, 'all', DF markers) form a coda that appears after the clause-final verb.[10] Definite *kù* is the most common coda element.

[9] In 8b, 'stone' would be tone-lowered by the adjective even in the absence of the demonstrative, so a cyclical model is at least possible. In 8c, the demonstrative is the only controller so it is clearly responsible for tone-lowering both the noun and the numeral.

[10] Other West African languages in which determiners follow relative clauses include Gwari (Hyman 1971) and Jukun (Shimizu 1980).

In Ben Tey, like some other Dogon languages, the verb has overt participial (Ppl) morphology, agreeing in nominal features (animacy, number) with the HEAD rather than with the subject. The perfective positive and imperfective positive endings are given in Table 3.[11]

	ANIMATE SG	ANIMATE PL	INANIMATE
PERFECTIVE	-m̀	-mà	-ẁ
IMPERFECTIVE	-m	-Ø (archaic -mù)	-m̀

TABLE 3. Ben Tey participial suffixes on relative clause verbs, agreeing with head NP.

When a nonsubject relative has a pronominal subject (‘the dog that **you** bought’, ‘the day when **I** came’), the subject is expressed by a clitic-like pronominal preposed to the verb, rather than by the pronominal suffix that would occur in a main clause. Preposed subject pronominals do not occur in subject relatives (‘the person who came’), where they would serve no purpose.

The linear structure of a Ben Tey relative construction is schematized as 9, where ellipses may be filled by nonhead constituents, including NPs and adverbials.

(9) … [internal head NP] … (SubjPron) participle NP-coda

Examples of Ben Tey relatives are given in 10. The internal heads are in boldface in the interlinears (second rows). The structural components, as in 9, are indicated in the third row of each example.

(10) a. yà^{L} éléy tíyé-m̀ kù
woman^{L} peanuts sell.PRF-PPL.AN.SG DEF
head … participle coda
‘the woman who sold (the) peanuts’ (*yǎ-m*, PL *yǎ:*) (Ben Tey)

b. yéŋgù yì-tɛ̀:^{L} ú yí-mà kù
yesterday **child-AN.PL**^{L} 2SG.SUBJ see.PRF-PPL.AN.PL DEF
… head SubjPron participle coda
‘the children who(m) you.SG saw yesterday’ (*yì-tɛ̌:*) (Ben Tey)

c. [ɔ̀r^{n}ɔ̀^{L} kà:^{n}] î: éw-yé-ẁ kù
[**place**^{L} REL] 1PL.SUBJ sit-MEDPASS.PRF-PPL.INAN DEF
[head] SubjPron participle coda
‘the place that (= in which) we settled’ (*ɔ́r^{n}ɔ̀*) (Ben Tey)

d. [tòy^{L} mǎ:] ɔ̀r^{n}ɔ̀^{L} ú tɔ́-m̀
[sowing^{L} dry] **place**^{L} 2SG.SUBJ SOW.IMPF-PPL.INAN
… head SubjPron participle
‘the place (= part of the field) where you are doing the dry-sowing’ (Ben Tey)
(Note: tone-lowering of ‘sowing’ is due to the adjective ‘dry’.)

e. nàw^{n}â: [dògùrù^{L} kà:^{n}] gǒ:-rɛ̀-ẁ wôy
meat [**time**^{L} REL] go.out-PRF-PPL.INAN every
… [head] participle coda
‘any time (= whenever) meat (= a game animal) comes out’ (*dógúrú*) (Ben Tey)

[11] Ben Tey participial suffixes are often distinct from nominal and adjectival suffixes for the same category. Imperfective positive participles are related to agentives. In a few Dogon languages, including Najamba, there are distinct participial series for subject and nonsubject relatives. In some other languages, the verb of a relative construction has no overt feature agreement with the head, perhaps because in these languages definite markers, which are common in relatives, do show agreement.

f. nà:^{L} yàgá-m̀
cow^{L} fall-PRF.PPL.AN.SG
head participle
'(a) cow that fell' (*nă:-m* with AN.SG suffix) (Ben Tey)

g. bèrè^{L} ér^{n}é=nì í súyɔ́-ẁ kù
stick^{L} 3SG=ACC 1SG.SUBJ hit.PRF-PPL.INAN DEF
head … SubjPron participle coda
'the stick with which I hit it/him/her' ([*béré kù*] *ɲây*^{n} 'with the stick') (Ben Tey)

h. àr^{n}à^{L} [ér^{n}é ^{HL}yí-m̀] bármɛ́-m̀=bɛ̌-m̀ kù
man^{L} [3SG.POSS ^{HL}child-AN.SG] be.hurt-IMPF=PST-PPL.AN.SG DEF
head … participle coda
'the man whose child had been hurt' ([*ár^{n}à-m kù*] *yí-m̀* 'the man's child') (Ben Tey)

Examples 10b,d,e demonstrate that the overt head is internal to the relative clause, though it can happen to be the clause-initial constituent, as in 10a,c,f,g,h. Nevertheless, the internal head has a number of features that suggest that it has acquired its form upstairs, in the position occupied by external heads in languages like English. The relevant features are summarized in 11.

(11) Features suggesting an external origin of the internal head NP
a. separation of internal head (Poss-N-Adj-Num) from its coda
b. tone-lowering of internal head, as before reference restrictors
c. omission of AN.SG suffix *-m* on head (10a,f,g), as before an adjective
d. optional presence of a relative morpheme *kà:^{n}* after head (10c,e)
e. omission of postposition after relative head (10g)
f. separation of possessor NP from possessed NP when the former is relative head, replacing, for example, [NP_1 $^{(H)L}NP_2$] (see §4.2 below) with [[NP_1]$_x$ [his/her/their$_x$ $^{(H)L}NP_2$]] including a resumptive pronoun (10h)

These details can be accounted for by assuming an underlying structure like 12 for the overall NP containing the relative clause (RC). The entire sequence is an NP with a relative clause inside it, following adjectives and numerals but preceding determiners and other late-NP elements. The relative clause includes a null NP coindexed with the entire outer NP.

(12) [$_{NP}$ Poss N (Adj) (Num) [$_{RC}$ (Rel) … $\varnothing_x$ … verb] Dem Def Pl 'all' DF]$_x$

In this model, the apparent bifurcation into internal head and coda is directly accounted for. Tone-lowering of the maximal Poss-N-Adj-Num sequence is consistent with that of other R-to-L controllers (adjectives and demonstratives). The omission of the animate singular suffix *-m* on the head is directly comparable to its absence on nouns followed by adjectives, as in *nà:*^{L} *bár^{n}à-m* 'brown cow' versus unmodified *nă:-m* 'cow'; see Table 1 in §2 above. The optional presence of the relative marker *kà:^{n}* at the end of the internal head makes structural sense after an external head; compare English *that* or Spanish *que* in relatives. The omission of adpositions, as in 10g, reflects structural conflicts between external (upstairs) and internal NP/PP forms, which in some other languages can be resolved by pied-piping (*the person **to whom** I gave ...*). The breakup of otherwise tightly knit possessor-possessed NPs, as in 10h, reflects similar structural conflicts. Base-generation of the internal head within the relative clause, with no movement, would leave all of the details in 11 puzzling.

Syntactically, the most unusual aspect of this analysis is that the Poss-N-Adj-Num portion of the overall NP in 12 moves downward (in linear terms, rightward) into the relativization site represented as $\varnothing_x$. That is, the 'internal head NP' is really just the portion of the overall NP that would otherwise occur to the left of the relative clause, and it takes its form there but subsequently moves. (We take no position here as to whether movement is equivalent to copying plus phonological suppression of the original.) The resulting construction is relatively easy for listeners to parse since (i) the internal position of the head clarifies the grammatical relation of the coindexed internal NP, especially as subject versus object, and (ii) the telltale traces of an external origin on just one clause-internal NP facilitate identification of it as the head.[12]

For the present article, the key point is that tone-lowering of (apparently) internal head NPs can be reconciled with tone-lowering to {L} preceding other R-to-L controllers. It suffices to allow tone-lowering to occur in the stage represented by 12, that is, before downward movement into the relative clause. In §7.3 below, we describe a somewhat similar case, where movement of clitic-like pronominals complicates a tonosyntactic analysis.

4.2. LEFT-TO-RIGHT CONTROL.[13]

PRENOMINAL POSSESSORS. The only L-to-R tonosyntactic controllers are prenominal possessors. In all Dogon languages, nonpronominal possessor NPs precede the possessed NP. In Ben Tey and a few others, pronominal possessors are also prenominal.

To our knowledge, only three Dogon languages (Jamsay, Tommo So, and Yanda Dom) have possessed NP constructions of the type [Poss GEN NP], where the possessor is separated from the following possessed NP by an overt genitive (possessive) morpheme GEN; see §7.3 below for detailed discussion (in connection with adjacency). The predominant Dogon pattern is direct juxtaposition of the possessor NP (with no tonal or morphological change) to the following possessed NP. The latter is marked by a tone overlay whose form depends on the language: {L}, {HL}, {LH}, or {H}. Some languages have two or even three of these possessor-controlled overlays, the choice depending on various syntactic-category and phonological input features.

In Ben Tey, possessors control {L} or {HL} overlays. The rules are given in 13.

(13) Possessor-controlled tone overlays (Ben Tey)

POSSESSOR IS …	OVERLAY IS …
i. NP containing quantifier or determiner	{HL}
ii. pronominal, or a simple core NP, and …	
a. overt possessor ends in H-tone	{HL}
b. overt possessor ends in L-tone except …	{L}
c. possessor is 1SG (floating L)	{HL}, merging as L+{HL}

[12] Within syntax-centric generative models, internally headed relatives are analyzed as having base-generated downstairs overt heads that are coindexed either to a phonologically null or zeroed upstairs head, or to no upstairs element at all (Broadwell 1985, Cole 1987, Culy 1990, Basilico 1996). No post-1970 generative analysis allowing downward/rightward movement of overt heads of relative clauses is reported in the extensive surveys of relative clause models in Bianchi 2002a,b and de Vries 2002. The ramifications of the movement analysis for Dogon internally headed relatives are best discussed elsewhere in a crosslinguistic context. Ben Tey and other Dogon data can play an interesting role in this larger discussion, precisely because tonosyntactic and morphological evidence of modification can be adduced.

[13] Conflicts among two or more potential tonosyntactic controllers occur when an R-to-L and an L-to-R controller are both present, flanking the noun, as in combinations like Poss-N-Dem. See §8.2 for a brief discussion.

In 14–16 below, the possessed noun is lexically /LHL/-toned *ìsê:* 'village'. Overlays are indicated by a superscript ^{L} or ^{HL} on the LEFT edge of the targeted words, since the controller is now to the left.

In 14, we see the {HL} overlay on the possessed noun after a quantified over or determined possessor, regardless of the latter's final tone, which happens to be high in 14a and low in 14b–c. Example 14c illustrates recursive possession.

(14) a. [ár^{n}à tà:nú] ^{HL}ísè:
[man three] ^{HL}village
'(a/the) village of [three men]' (Ben Tey)

b. [ár^{n}à-m kù] ^{HL}ísè:
[man-AN.SG DEF] ^{HL}village
'[the man]'s village' (Ben Tey)

c. [ú ^{HL}lésù bè] ^{HL}ísè:
[2SG.POSS ^{HL}uncle PL] ^{HL}village
'[your.SG uncles]' village' (Ben Tey)

Consider now cases where the possessor is pronominal and has segmental content (i.e. it is not 1SG). If it ends in an H-tone, the overlay is {HL} as in 15a, but if it ends in an L-tone, the overlay is {L} as in 15b.[14]

(15) a. ú ^{HL}ísè:
2SG.POSS ^{HL}village
'your.SG village' (Ben Tey)

b. û: ^{L}ìsè:
2PL.POSS ^{L}village
'your.PL village' (Ben Tey)

When the possessor is an unquantified and undetermined noun, with or without an adjectival modifier, we get the same split between {HL} as in 16a and {L} as in 16b, the choice depending on the final tone of the possessor.

(16) a. yǎ-m ^{HL}ísè:
woman-AN.SG ^{HL}village
'a woman's village' (Ben Tey)

b. ár^{n}à-m ^{L}ìsè:
man-AN.SG ^{L}village
'a man's village' (Ben Tey)

A 1SG possessor is expressed only by a floating L-tone that docks on the left edge of the possessed NP. This tonal morpheme, underlying |L|, combines with the stem-wide {HL} overlay to form {LHL}, which is more perspicuously labeled L+{HL}. If 1SG |L| behaved like other L-final possessors, we would expect it to be followed by an {L}-toned possessed noun, and 1SG |L| would merge inaudibly with the L-tones of the noun. We must therefore specify that 13.ii.b is applicable only when the possessor is segmentally overt (i.e. separately audible), leaving the 1SG possessor to be treated separately as 13.ii.c. For example, lexically /LHL/-toned *dà:mbâ:* 'short hoe' becomes {HL}-toned *dá:mbà:* after a final-H-toned pronominal possessor, as in *ú* ^{HL}*dá:mbà:* 'your.SG short hoe'. The 1SG form, presurface |L *dá:mbà:*| with floating L, is realized as $^{L+HL}$*dă:mbà:* 'my short hoe', that is, with L+{HL} melody.

[14] The 2PL pronoun *û:* might also be analyzed as 2SG /ú/ plus a quasi-intonational feature involving vocalic prolongation and falling pitch. In any event, it clearly ends in low tone (or pitch), so at most a small rephrasing of the rule might be needed.

We return to the phonological aspects of the choice among tone overlays, for example, Ben Tey {HL} versus {L}, in §7 below.

POSTNOMINAL POSSESSORS. We can here only briefly discuss the tonosyntactic complications posed by postnominal pronominal possessors. These are absent from Ben Tey and some other languages, including Jamsay, but they are common or even obligatory for pronominal possessors in several Dogon languages, at least for alienable possession. Typically a postnominal possessor follows a maximal N-Adj-Num sequence and precedes other NP-internal modifiers.

The predominant form of postnominal possessive constructions is schematized in 17a, where the ellipsis may be filled by an adjective or a numeral, and where superscripted (H)L represents the possessor-controlled overlay in the language. An example from Nanga is 17b.

(17) a. $[\text{N} \ldots]_x$ $[\text{2SG}\ ^{(\text{H})\text{L}}\text{Classifier}_x]$
'your.SG N'

b. [ǹdò$^{\text{L}}$ ɔ̀wɔ́ kúrê] [ú $^{\text{HL}}$yɛ̂]
[house$^{\text{L}}$ big six] [2SG $^{\text{HL}}$POSS.INAN.PL]
'your.SG six big houses' (Nanga)
(Note: *ńdô* 'house' is tone-lowered by the following adjective.)

That is, the actual possessed NP ('six big houses') is resumed by a singular or plural possessive classifier with an original sense like 'thing(s)' or 'critter(s)' depending on animacy. Postposed possessors do not control tone overlays on preceding words, but this may be attributable to their appositional status. In 17b, the appositional classifier, not 'house', has the falling tone consistent with possessor control. To be sure, original combinations like the well-preserved Nanga [*ú* $^{\text{HL}}$*yɛ̂*] have undergone phonetic attrition or have merged into a single possessive morpheme in some other Dogon languages.[15] However, given the basically appositional character of these possessives, their failure to control tone overlays on preceding words is not a clear counterexample to our model.

4.3. SUMMARY OF §4. We have shown that modifying adjectives, demonstratives, and (in our analysis) relative clauses control {L} on preceding nouns and other intervening modifiers, and that prenominal possessors control various tone overlays on (at least) the following noun. These generalizations apply to Ben Tey and to most other Dogon languages.

5. REFERENCE RESTRICTION.

5.1. SEMANTICS OF DOGON TONOSYNTACTIC CONTROLLERS. We claim that the shared trait that unites all of the tonosyntactic controllers identified in §4 is REFERENCE RESTRICTION. As we define it, reference restriction excludes the noncontrollers described in §3. Our central claim is therefore 18.

(18) REFERENCE RESTRICTION IS THE BASIS FOR TONOSYNTACTIC CONTROL: NP-internal modifiers that belong to stem classes or to syntactic or functional categories that include and exclude specific individuals of a reference set, and no other modifiers, control tone overlays on (at least) the noun.

Our notion of reference restrictor is very simple. An unmodified common noun such as 'donkey' denotes an open set of individuals that satisfy its definitional criteria. When a

[15] This loss of transparently appositional form could easily result in a syntactic reanalysis; since nonpronominal possessors are prenominal as in [Poss $^{(\text{H})\text{L}}$N], pronominal possessors as in [N Poss] might be (re)interpreted as having moved from pre- to postnominal position.

reference restrictor combines with a common noun, the individuals in this open set are bifurcated into two subsets, one whose individuals are specifically included and a second whose individuals are specifically excluded, as illustrated in Table 4.

	MODIFIED NOUN	INCLUDES	EXCLUDES
ADJECTIVE	'gray donkey'	gray donkeys	nongray donkeys
DEMONSTRATIVE	'this donkey'	this donkey	that donkey, all other donkeys
RELATIVE	'the donkey I saw'	the donkey I saw	all donkeys that I didn't see
POSSESSOR	'my donkey'	my donkey	your donkey, all other donkeys

TABLE 4. Reference restriction.

By contrast, nonsingular quantifiers and DF markers lack this restrictive function. DF markers such as the topic marker, 'only', and 'even' do not add to or subtract from the set of individuals denoted by the NP. 'As for my donkeys', 'only my donkeys', and 'even my donkeys' denote the same set as 'my donkeys'. Supplementary entailments ('only') or implicatures ('even') that affect unexpressed disjunct sets do not contradict this point.

Consider now the nonsingular quantifiers that make up the remaining noncontrollers. Certainly 'all' is not restrictive, since it cannot exclude any member of the set. A plural marker, such as the independent plural particle *bè*, is not restrictive, since, for example, 'donkeys' can denote any nonsingular set of individuals, including the universal set 'all donkeys'.

The remaining noncontrollers are nonsingular numerals like 'six'.[16] It is true that 'six donkeys' does not exhaust the set of 'all donkeys'. However, 'six' does not intersect 'donkeys' in the same way that a reference restrictor like 'big' or 'these' does. If I say *I need six donkeys*, each individual donkey has an equal chance to be included, since any asinine sextet will do. In other words, the relevant function is PERMUTATION INVARIANT (Keenan & Stavi 1986:308). Furthermore, this utterance lends itself to a minimalist interpretation ('at least six donkeys'). An additional reference restrictor ('these six donkeys', 'my six donkeys', 'the six donkeys that I bought') is necessary to explicitly include and exclude specific individuals. By contrast, *big donkey* immediately excludes some individuals, and *this donkey* excludes any donkey that is not proximal.

Things are more nuanced with utterances like *Six donkeys got into my millet field*. As this sentence is being uttered, the speaker may already have in mind a specific set of known individuals (Keenan 1996:50). But this set is not available to the listener as a discourse referent until after the utterance. Especially for the listener, cardinality is most important on the first introduction, and subsequent anaphoric references by either interlocutor can omit the numeral (*the donkeys*, *those donkeys*). We return to the pragmatics of numerals in §6.4 below, where we argue that specificity is most salient for the lowest numeral 'one', which is treated in some Dogon languages as a reference restrictor and therefore as a tonosyntactic controller.

We struggle to find a category matching our notion of reference restrictor in current semantic theory. The two most relevant categories, determiner and quantifier, have acquired nontraditional senses that make them difficult to use. DETERMINER now has a

[16] Discussion of the pragmatics of numerals vis-à-vis (other) determiners in the literature, going back to Grice (1989) and Horn (1972), has focused on how to account for the minimalist ('at least *N*') interpretation of quantified NPs and the associated scalar implicatures. These issues bear only tangentially on reference restriction as we define it. If anything, minimalist interpretations tend to blur the line between included and excluded individuals.

broad usage that includes many quantifying expressions (Q-determiners), as well as definites, demonstratives, and possessors (D-determiners), instead of a more traditional sense focally including definites and demonstratives. English lexical determiners in this sense include *every*, *all*, *most*, *the*, *this*, *my*, *John's*, and *ten* (Keenan 1996:45). Adjectives are not determiners, however, since N-Adj combinations have the same logical type (e, t) as unmodified common nouns. So determiners in the current technical sense cut across the boundary between reference restrictors and non-reference restrictors.

QUANTIFIER now has an even more nontraditional technical definition, requiring a restriction on a set in addition to a nuclear scope (e.g. Heim 1982). This definition is often interpreted to exclude such quantifying expressions as 'many', 'all', and numerals, as in several of the papers on quantification in nonwestern languages in Matthewson 2008. This results in the odd situation where 'many' and 'six' are considered to be determiners but not quantifiers. Whether in this narrow definition, or in the more traditional one that includes all quantity expressions, quantifier does not line up with either reference restrictor or non-reference restrictor.

Our notion of reference restrictor is, however, akin to the notion of RESTRICTIVE MODIFIER, which is current in English composition manuals, and familiar to linguists especially in connection with restrictive versus nonrestrictive (parenthetical) relative clauses. The distinction also applies to adjectives, as in *your good leg* (restrictive) versus *your good wife* (usually parenthetical).

Our claim in 18 above that reference restriction is the key to tonosyntactic control is robustly supported by the data in §§3–4 above. These data are from Ben Tey, but they are matched in several other Dogon languages that have very similar tonosyntactic systems.

5.2. PARALLELS IN OTHER LANGUAGES. We are now in a position to consider parallels to Dogon tonosyntax in other languages. Examples are not given as they would require considerable markup and commentary.

Two Papuan languages have Dogon-like features. In Awa, prenominal adjectives belong to two classes. One controls {LH}, and the other controls {H}, both on a following noun. Other prenominal modifiers, including possessives, 'all', 'just', and 'not', have no tonal effect on the noun. The adjective-controlled overlays can extend across the noun to postnominal adjectives as in $[\mathrm{Adj}_1\ ^{\mathrm{LH}}[\mathrm{N}\ \mathrm{Adj}_2]]$, so we have another case of multiword targets (Loving 1973). Another Papuan language, Usarufa, also has some Dogon-like features in possessive constructions (Bee & Glasgow 1973).

Back in Africa, two Nigerian languages have interesting systems. In Nkoroo, a noun preceded by certain modifiers ('one', demonstrative, possessive clitic) has an {HL} or {L} overlay (Akinlabi et al. 2009). We do not know whether multiword targets are possible. In Kalabari (Harry & Hyman 2012), prenominal modifiers control various overlays on the following noun. Possessors control {HLH}, interrogatives and demonstratives control {LH}, and quantifiers including numerals control {L}. Adjectives, however, have no tonal effect on the noun. If the noun is preceded by two controllers, as in $[\mathrm{C}_1\ \mathrm{C}_2\ \mathrm{N}]$, either C_1 targets the two-word $[\mathrm{C}_2\ \mathrm{N}]$ sequence with its overlay, or a default melody is applied. The multiword targets resemble those of Dogon, but no sweeping semantic generalization about controllers or about specific overlays seems to be warranted for Kalabari. We look forward to more reports of tonosyntactic systems, as hundreds of African languages remain undescribed or are described with little or no coverage of tonal systems.

6. Borderline cases. A few elements in Dogon NPs have variable tonosyntactic statuses as controllers or noncontrollers across Dogon languages. These are definites, the numeral 'one', the partitioning quantifier 'some, certain ones', and the distributive quantifier 'each'. In many cases, the crosslinguistic variation has to do with which open stem class these elements are assigned to. For example, those assigned to the adjective class are controllers, but those assigned to the numeral class are noncontrollers. A second complication is that stems in different languages with similar glosses may differ semantically in subtle ways, perhaps not yet understood, that could tip the scales in favor of controller or noncontroller status.

We omit detailed discussion of 'each' and partitioning 'some'.[17] Definites (§6.1) and the numeral 'one' (§6.2) warrant discussion here, however, since they bring out the role played by tonosyntax in diachronic developments.

6.1. Definites. Demonstratives ('this', 'that') are clearly reference restrictors, including but simultaneously excluding specific individuals (this donkey, not that donkey). By contrast, definite markers do not saliently exclude individuals from the same common-noun set. A token of *the donkey* is felicitous in a context involving one donkey and some number (perhaps zero) of nondonkeys. If two different donkeys are active discourse referents, an additional reference restrictor (*the brown donkey* or *the brown one*) or an anaphoric or obviative device is needed to refer unambiguously to a particular one:

> … if I ask someone to pass me *the box*, referring to some box in the immediate situation of utterance, this presupposes that there is only one such object in that situation. But *this box* or *that box* need not refer to some unique box in the situation. … when there are several boxes in the situation the use of *this* as opposed to *that* will often enable the hearer to pick out one box from another. (Hawkins 1978:156)

Listener accessibility, or identifiability, rather than exclusion has rightly been emphasized in the literature on definiteness (Lyons 1999, Epstein 2002). The Dogon definites relevant here fit this semantic description. They generally function as weak discourse definites, lacking the exotic secondary functions of English *the* such as genericity (*the cobra is a dangerous snake*) or unique reference (*the sun*). As discourse-bound definites, they do not force universal readings in the fashion of English *the members of Parliament* (Hawkins 1978:159), but Dogon definites are compatible with such readings: 'the donkeys' may denote an entire contextually relevant set, as long as the latter has been introduced as a discourse referent.

[17] Briefly, distributive 'each' differs from universal 'all' in that 'each' decomposes the maximal set, adopting the perspective of single individuals, as shown by its cooccurrence with singular nouns in, for example, *Each boy recited a (different) poem* (Carlson 1987); see also Brasoveanu 2011 on quantificational embedding. In its individualizing aspect, 'each' is arguably a reference restrictor, and indeed distributive quantifiers are tonosyntactic controllers in some Dogon languages. Analysis is complicated by the following: (i) several of the languages have an undifferentiated 'all, every, each' quantifier; (ii) an original 'each' quantifier **kámà* survives in some languages only in the sense '(not) any'; and (iii) reflexes of **kámà* behave like compound finals rather than as independent words in some languages.

Partitioning quantifiers 'some, certain ones', usually reflecting **gàmbú*, are unquestionably reference restrictors. English *some* has a weak sense often represented by *Sm* (or *sm*), as in *I saw Sm apples at the market* (Postal 1966:204, Milsark 1977:7), and a strong, or presupposing, sense represented by *some* or nowadays by all-caps SOME. The Dogon forms are of the latter type. NPs containing them explicitly denote strict subsets of the larger set. These NPs are often overtly paired with others that denote the complementary subsets, and this pairing is implicit even when covert. The problem for tonosyntactic analysis is that the reflex of **gàmbú* is assigned variably to adjective or numeral stem classes, with the usual consequences for tonosyntactic control.

However, definites famously evolve out of adnominal demonstratives, which are classic reference restrictors. In the standard trajectory, deictic 'that' becomes first a strong discourse-definite 'that (same, aforementioned)', then a bleached, weak discourse-definite 'the' (Greenberg 1978, Diessel 1999). The evolution is gradual, and a nuanced range of synchronic functions may subsist at any given stage. In view of this, under what conditions does the evolution from demonstrative to definite bring about the loss of tonosyntactic controller status? The answer probably depends on language-specific contextual issues including homophone avoidance and functional load.

In Nanga, definites derived from demonstratives preserve their controller status. There is a single demonstrative series ('this/that') with no proximal/distant opposition (adverbs like 'here' and 'there' are added to specify distance from deictic center), and a morphologically parallel definite series. Their paradigms, along with those of third-person personal pronouns, are given in Table 5.

	ANIMATE SG	ANIMATE PL	INANIMATE SG	INANIMATE PL
DEMONSTRATIVE	N^L wǒ-ŋ	N^L wǒ:-yè	N^L ŋ̀gú	N^L yěy ~ N^L ŋgú-yè
DEFINITE	N^L né	N^L bû:	N^L gú	N^L ý
3RD-PERSON PRONOUN	ńné	bû:	kú	kû:

TABLE 5. Nanga demonstratives and definites, with preceding noun, and personal pronouns.

Table 5 shows that Nanga definites and demonstratives are not homophonous. Importantly, both demonstratives and definites control {L} on preceding nouns (or adjectives). For example, *ńdô* 'house' drops to {L} before a demonstrative in 19a and before a definite in 19b.

(19) a. ǹdò^L ŋ̀gú
house^L DEM.INAN.SG
'this/that house' (Nanga)

b. ǹdò^L gú
house^L DEF.INAN.SG
'the house' (Nanga)

Diachronically, the scenario in 20 is plausible for Nanga.

(20) a. Inanimate demonstratives (perhaps near-distant) developed into inanimate definites, preserving tonosyntactic controller status.
b. The definite paradigm was completed by innovating animate forms, derived from third-person personal pronouns, which analogically adopted tonosyntactic controller status.
c. Definites remain closely linked to demonstratives because of the high functional load of their animacy and number marking.

For 20b, note the similarity between animate definites and the animate third-person pronouns in Table 5. For 20c, an interesting feature of Nanga is that nouns (except 'woman' and 'child'), adjectives, and numerals lack the suffixal marking of animacy and number that some other Dogon languages (including Ben Tey) have. As a result, determiners are relied on heavily to mark these categories in Nanga. This and other language-specific factors may have favored retention of a full demonstrative paradigm, and a continuing association between definites and demonstratives.

In some other Dogon languages where definites evolved out of demonstratives, these definites did lose their tonosyntactic controller status as their reference-restricting functions dwindled, unlike the case in Nanga. This is important since it can only be ex-

plained as a result of the reference-restricting principle in 18. An excellent example is Najamba, which has proximal, near-distant, and far-distant demonstrative series. The near-distant demonstratives ('that/those near you or a short distance away') are identical in form to definites, both tonally and segmentally, as shown in Table 6. (There are two distinct inanimate noun classes, E and O.)

	ANIM SG	ANIM PL	INAN SG (E)	INAN SG (O)	INAN PL
NEAR-DISTANT	N^L mó	N^L bé	N^L ké	N^L kó	N^L yé
DEFINITE	N mó	N bé	N ké	N kó	N yé

TABLE 6. Najamba near-distant demonstratives and definites, with preceding noun.

In demonstrative function, the Najamba forms in Table 6 control {L} on preceding nouns, whereas in definite function they do not. Compare near-distant demonstrative 21a with definite 21b, focusing on the tones of the lexically /LH/-toned noun *pègé* 'sheep', which is tone-lowered only in 21a. The opposition between near-distant (deictic) and definite is covert, expressed only indirectly by the presence or absence of an {L} overlay on the preceding word(s).

(21) a. pègè^L mó
sheep^L NEARDIST.AN.SG
'that sheep (over there)' (Najamba)

b. pègé mó
sheep DEF.AN.SG
'the sheep.SG' (Najamba)

The similarities in form between definites and near-distant demonstratives in Najamba strongly suggest that original near-distant demonstratives split into two closely related paradigms, one preserving the old deictic sense and the other reduced to weak discourse-definite function. The bridge between the two senses was the originally secondary use of near-distant demonstratives as recent discourse-definites: 'that X (that we just mentioned)'. The suggested diachronic evolution is summarized in 22.

(22) a. The original near-distant demonstrative paradigm split into near-distant and definite functions.
b. In definite function, the forms lost their tonosyntactic control power on preceding word(s).

The developments in 22b were likely accelerated by the fact that the definites and near-distant demonstratives would have initially been indistinguishable. Such oppositions as that of 21a to 21b became possible only when definites lost the ability to control {L} on preceding nouns.

Nanga and Najamba, taken together, show that definites derived from demonstratives have some wiggle room as to whether they remain tonosyntactic controllers or whether and how rapidly they lose their power to control overlays. However, Najamba, and other Dogon languages with similar systems not presented here, show clearly that if demonstratives and definites part ways tonosyntactically, it is always the definites that lose controller status. They are at best borderline reference restrictors.

6.2. NUMERAL 'ONE'. We have seen that nonsingular numerals, including the basic, morphologically simple numerals from 'two' to 'ten', lack tonosyntactic control powers in our sample of languages (§3.1), in sharp contrast to adjectives and demonstratives.

'One' forms are notoriously malleable semantically and pragmatically, however, much more so than higher numerals like 'six'. They routinely evolve into indefinite ar-

ticles like *a(n)* via intermediate stages (Heine 1997:71–72), into indefinite pronouns like *(some)one* (Haspelmath 1997), or into gap-filling expletives as in *big one(s)*. The pragmatic issues have been addressed in the literature by distinguishing specificity or identifiability from mere cardinality; see especially Givón 1981, 1984. See also the papers in Ebert & Hinterwimmer 2013.

Using labels customized for Dogon, we classify recurrent functions of 'one' forms as in 23, while acknowledging that boundaries are fuzzy.

(23)

FUNCTION	COMMENT
a. PURE QUANTIFICATION	
cardinality	'one cow' as opposed to some other quantity
b. PRAGMATIC	
discourse-referent (DR) introduction	compare the English indefinite article *a(n)*
shared identity	'X and Y are one (and the same) person'
limitation	'(just) a/one single cow'

The cardinality function of 'one', as in answers to 'how many?' questions, is uncontroversial. In the various pragmatic functions, cardinality is not suppressed, but its salience is reduced.

In pure cardinality function, 'one' is no more a reference restrictor than higher numerals. However, there is an element of reference restriction in the pragmatic functions. The strongest case for reference restriction is in DR-introductions when the referent is specific and is expected to play an important role in the ensuing discourse; see Givón 1984:177 on 'major topics' introduced with Krio *wan* 'one'. This is hard to detect in, for example, 'I bought a cow', where cow-ness is usually salient (a cow instead of a sheep). With human referents, whose individual identity is more likely to matter in the discourse, there is a stronger awareness that a particular individual is being picked out from a larger set. Consider, for example, 'A man came into the room' at an inflection point in a narrative, where it might be paraphrased as 'A certain man came into the room' or colloquially as 'So this guy comes into the room' (note the reference restrictors in the paraphrases). Similarly, 'One (fine) day, …' fast-forwards over an intervening time interval to a specific day that becomes the setting for the next narrative segment.

Given the transitional status of 'one' as part cardinality quantifier, part reference restrictor, it is not surprising that 'one' and related forms have variable morphological and tonosyntactic status in Dogon languages. Many of the languages have a 'one' form that controls overlays, and a second coexisting 'one' form that does not.

Dogon 'one' forms mostly fall into two cognate sets, one (abbreviated TURU) derived from **túrú*, the other a set (abbreviated TUMX) derived from etyma including **tùmá* and **túmnɔ́*. Some languages have generalized either TURU or TUMX as the all-purpose 'one' form, while others preserve both, with some functional differentiation. TURU was probably once regular in cardinality environments, while TUMX had pragmatic functions. TURU is numeral-like and generally does not control overlays, while TUMX is adjective-like and generally does control overlays. For example, the primary 'one' form in Ben Tey is adjective-like *tùwᵐɔ́* (< **tùmá*), which controls tone-lowering on a preceding noun, while the primary 'one' form in Yorno So is numeral-like *túrú*, which does not.

More enlightening are languages where TURU and TUMX still coexist. Togo Kan has two high-frequency 'one' forms that follow nouns. Of these, numeral-like *túrú* does

not control tone-lowering, while adjective-like *túnɔ́* (< **túmnɔ́*, from the TUMX cognate set) does. In 24a,b, they combine with *péjú* 'sheep', which is tone-lowered in 24b but not in 24a.

(24) a. péjú túrú
sheep one
'one sheep' (Togo Kan)

b. pèjù^{L} túnɔ́
sheep^{L} one
'one sheep' (Togo Kan)

Togo Kan *túrú* is regular in classic cardinality contexts (answer to 'How many sheep?'). *túnɔ́*, by contrast, is characteristic of DR-introductions, as at the beginning of a narrative segment ('At that point, a certain sheep came along').

In Jamsay, *túmnó* (TUMX cognate set) occurs only as an adjective in pragmatic functions (shared-identity, limitation). The more common *túrú* is a numeral, but in one construction it has an interesting tonosyntactic twist. Consider 25a–c.

(25) a. dì:^{nL} túmnò
place^{L} single.LOC
'in a single (= the same) place' (< *dǐ:^{n}* 'place') (Jamsay)

b. dɔ̀ɣɔ̌-n túrú-n
Dogon-HUM.SG one-HUM.SG
'one Dogon (person)' (Jamsay)

c. ènέ mà nùmò^{L} túrù
3SG.REFL POSS hand one
'one of his (own) hands' (< *nùmó* 'hand') (Jamsay)

In 25a, *túmnó* is an adjective and controls {L} on the preceding noun (the final L-tone in *túmnò* expresses locative case and can be disregarded). The pragmatic context for *túmnó* is limitation ('single, solitary, sole'). *Túrú* is the standard numeral 'one' and is unchallenged in cardinality function. Tonosyntactically it is treated like other numerals, so it fails to control {L} on the preceding noun in 25b. Of special tonosyntactic interest is the construction in 25c. Here *túrú* itself becomes *túrù*, but more importantly it now controls {L} on the preceding noun. This construction is attested only in NPs that denote singleton members of body parts that occur in pairs ('hand', 'eye'). Cardinality is not suppressed, but in this specific context there is a clear reference-restricting element, since the paired body part is excluded. The construction in 25c, perhaps a recent innovation, suggests that the reference-restricting basis for tonosyntactic control is alive and well in Jamsay.

We know of only one glaring counterexample to the correlation of cardinal 'one' with absence of tonosyntactic controller status, and this is likely the result of a recent semantic shift. Najamba has two high-frequency 'one' forms, *tɔ̀mɛ̂:* (noun-class variant *tɔ̀mɔ̂:*) and *kúndé* (noun-class variant *kúndú*). *tɔ̀mɛ̂:* occurs chiefly in pragmatic functions (limitation, shared identity, 'one day' as temporal setting introducer), while *kúndé* prototypically expresses cardinality. Following our semantic playbook, *kúndé* should be a noncontroller and *tɔ̀mɛ̂:* should be a controller, but the opposite is true. The noun *nɔ̌:* 'person' is tone-lowered in 26a, but not in 26b.

(26) a. nɔ̀:^{L} kúndé
person^{L} one.AN.SG
'one person' (Najamba)

b. nɔ̌: tɔ̀mɛ̂:
person one.AN.SG
'a single person, the same person' (Najamba)

The situation is particularly odd in that *tɔ̀mɛ̂:* belongs to the TUMX cognate set descended from **tumX*, whose non-Najamba cognates generally are tonosyntactic controllers.

We propose the diachronic scenario in 27.

(27) a. TUMX was generalized at the expense of TURU, which disappeared.
b. TUMX had now become the all-purpose 'one' form, including pure cardinality as well as the older pragmatic functions, and it came to be treated tonosyntactically like other numerals, thereby losing its original controller status.
c. An original adjective **kúndé* (class variant **kúndú*) 'whole, intact' underwent a semantic shift to 'one' in cardinality function, but has preserved its adjective-like tonosyntactic controller status.

Although the synchronic result is a reversal of the usual pattern, stage 27b is consistent with our theory, since the generalization of TUMX necessarily diluted its former reference-restricting power, and 27c is simply a case where a recently shifted stem has retained (so far) its old tonosyntactic status.[18]

6.3. SUMMARY OF §6. The correlation of tonosyntactic control with reference restriction is not strict in the borderline cases, viz. definites and the numeral 'one'. However, the correlation does seem to be a real factor in diachronic developments. Definites derived from demonstratives may shift to noncontrollers, but this shift may be blocked, delayed, or accelerated by language-specific factors, particularly those involving homophony or high functional load. In the case of 'one', there is a general correlation of cardinality function (usually TURU) with numeral-like status (non-reference restrictor, noncontroller), and of more pragmatic functions (usually TUMX) with adjective-like status (reference restrictor, controller), the only glaring counterexample involving a recent shift in Najamba of an adjective into numeral function.

7. WHAT THE TONOSYNTAX KNOWS ABOUT PHONOLOGY. The phonological form of stems is never a factor in determining controller or target status. In this article we disregard details of the phonological implementation of tone overlays, which is handled by the regular tonal phonology of the language.[19] Our analysis of the ontology of tonosyntax is incomplete, however, without consideration of phonological information about controllers and targets that affects the choice among overlays, such as {HL} versus {L}.

The key Dogon examples known to us involve possessors, and the phonological features are the final tone of the possessor (§7.1) and the prosodic weight (basically, mora count) of the possessed noun (§7.2). The issue is moot for those Dogon languages that

[18] Najamba *kúndé* has numerous cognates that preserve the original sense 'whole, intact', denoting, for example, a lump, a block, an unchopped log, or an uncut melon. Examples are the adjectives Jamsay *gúlúm*, Nanga *kúndí*, and Tommo So *kúnnu* (with atonal final vowel). Najamba itself has an adjective *kúndúlé* (with an unexplained extra syllable) in this sense.

[19] Implementation is nontrivial for contoured overlays like {HL} and {LH}. For example, if {HL} is overlaid on a trisyllabic noun, the tone break from H to L may occur close to the left or right edge, depending on the language. Conversely, if {HL} is overlaid on a monomoraic CV noun, it may be realized as falling tone, as high tone plus downstep on the following word, or as just high (or just low) tone with the other tonal element suppressed.

have only a single possessor-controlled tone overlay, but it is nontrivial for those that have two or more of them. In §7.3 we consider whether tonosyntactic processes require linear adjacency between controller and target.

7.1. Final tone of possessor. We showed in §4.2 above that possessor-controlled tone overlays in Ben Tey are {HL} and {L}. Choosing between them (see 13 above) requires access to both the internal syntactic composition and the phonological form of the possessor. In particular, when the possessor is of certain syntactic types, if the possessor ends in an H-tone we see {HL} on the possessed noun, as in 15a, but if it ends in an L-tone we see {L}, as in 15b.

To demonstrate that the final possessor tone is part of the tonosyntactic process, we must exclude the possibility that the choice between {HL} and {L} overlays is phonologically predictable. Suppose that pronouns and bare nouns have just one possessor-controlled overlay, but that after it is applied to the possessed NP, the final tone of the possessor spreads to the onset of the following possessed noun. There are two possible versions of this, depending on which of {HL} and {L} is chosen to be the sole underlying overlay for these possessors; see 28a,b.

(28) a. {HL} is the sole underlying overlay for pronominal and bare-noun possessors.
Requires suppression of H-tone in {HL} overlay after L-final possessor:
flattening: $[_{\text{poss}}\ \text{L}]\ \ ^{\text{HL}}[\text{HL}\ldots \rightarrow [_{\text{poss}}\ \text{L}]\ \ ^{\text{HL}}[\cancel{\text{H}}\text{L}\ldots$

b. {L} is the sole underlying overlay for pronominal and bare-noun possessors.
Requires tone-spreading of final H-tone from possessor to possessed NP:
spreading: $[_{\text{poss}}\ \text{H}]\ \ ^{\text{L}}[\text{L}\ldots \rightarrow [_{\text{poss}}\ \widehat{\text{H}}]\ \ ^{\text{L}}[\text{HL}\ldots$

The phonological process required by 28a would reduce an expected LHL sequence to L. It could be thought of as contour flattening, or possibly as rightward-spreading of the first L into the position occupied by H, knocking the latter out. The phonological process required by 28b is tone-spreading across a word boundary. The spreading in 28b is more straightforward phonologically and is common crosslinguistically. However, its {L} overlay cannot be unified with the unmistakable {HL} overlay controlled by quantified/determined possessors. Such unification would be permitted by 28a, but it is more awkward phonologically.

Neither analysis is supported by Ben Tey tonology. Flattening of LHL to L is not found elsewhere in Ben Tey, so there is no independent support for 28a. Bell-shaped lexical /LHL/ melodies are common and stable on words and stems, including monosyllabics (*ɔ̃ː* 'fiber', *jɛ̃ː* 'bring') as well as heavier stems and words. When a floating L docks on a word to its right that otherwise would begin with /HL…/, the output is LHL… . The segmentally null 1sg possessor morpheme is a floating L to the left of the possessed noun, which initially has {HL} overlay. For example, *dà:mbâ:* 'short hoe' becomes {HL}-toned after a final-H-toned pronominal possessor, as in 29a. The 1sg form, with floating L followed by the same {HL}-toned stem, is realized with surface $\widehat{\text{LH}}$.L melody.

(29) a. ú $^{\text{HL}}$dá:mbà:
2sg.poss $^{\text{HL}}$short.hoe
'your.sg short hoe' (Ben Tey)

b. $^{\text{L+HL}}$dă:mbà:
1sg.poss.short.hoe
'my short hoe' (< |L $^{\text{HL}}$*dá:mbà:*|) (Ben Tey)

Example 28b likewise receives no support from Ben Tey phonology. There are exact parallels to the proposed rightward H-spreading rule in many African languages, but not in Ben Tey. In 29a above, according to this analysis, presurface |*ú* ^{L}*dà:mbà:*| would spread the H-tone from 2SG *ú* into the left edge of the noun. However, 2SG *ú* does not elsewhere spread its tone into a following word with initial L-tones. This is exemplified by 30, where *ú* is an object pronoun in a relative clause.

(30) nù^{L} ú bì-bàrú
person^{L} 2SG.OBJ RDP-help.IMPF.PPL.AN.PL
'people who will help you.SG' (Ben Tey)

We conclude that the choice between {HL} and {L} overlays in Ben Tey possessives is made within the tonosyntax itself and is not the result of lower-level phonological implementation. We stand by the complex formulation for Ben Tey possessor-controlled overlays in 13, which makes reference to categories (pronoun, NP), internal syntactic structure (presence/absence of determiner or quantifier), and the phonological form of the possessor (its final tone, and whether it has segmental form).

7.2. PROSODIC WEIGHT OF POSSESSED NOUN. In some Dogon languages, though not in Ben Tey, the phonological form of the targeted possessed noun is relevant to the choice of the overlay. The lexical tone melody of the target is irrelevant—it is erased by the overlay. However, its word-level PROSODIC WEIGHT (light versus heavy) is relevant. This is the case, for example, in Togo Kan. Aside from two high-frequency nouns ('woman', 'child') that idiosyncratically show {L} overlay after a possessor, the productive overlays are {H} on LIGHT noun stems (up to two moras) as in 31a, and {HL} on HEAVY nouns (three or more moras) as in 31b.

(31) a. sè:dú ^{H}gírⁿí
Seydou ^{H}house
'Seydou's house' (< *gìrⁿí*) (Togo Kan)
b. sè:dú ^{HL}kégèrè
Seydou ^{HL}saddle
'Seydou's saddle' (< *kégérɛ́*) (Togo Kan)

As with correlations between possessor-final tone and choice of overlay (§7.1 above), we must consider whether the weight-sensitive possessor-controlled overlay split can be attributed to phonological implementation and therefore omitted from tonosyntax proper. Since we see {H} on light stems and {HL} on heavy stems, the thought occurs that the overlay as such might be uniform {HL}, but that the L-tone component is not realized on light stems.

However, there is no good reason why a bisyllabic Togo Kan noun like 'house' in 36a should not be able to express the full {HL} overlay. The realization of {HL} on trisyllabic 'saddle' in 36b is H.L.L, with the tone break from H to L after the first syllable, not H.H.L. If its third syllable were clipped off, the entire HL surface sequence should still be audible. By this logic, we should expect {HL}-toned #^{HL}*gírⁿì* instead of {H}-toned ^{H}*gírⁿí* in 31a.

Admittedly, CvCv common nouns (nouns denoting sets) and adjectives in Togo Kan do avoid /HL/-toned #CV́CV̀ as a LEXICAL melody. Diachronically, original *CV́CV̀ and *CV́CV́ adjectives and common nouns merged as CV́CV́. Similarly, other prosodically light shapes (#/CV̂C/, #/CV̂:/, #/CV̂/) are also disallowed for such stems. But constraints on lexical melodies do not generally apply to tonosyntactic overlays, the most striking example being the constraint against lexical /L/ in open stem classes in all languages in our sample, versus the high frequency of {L} as an overlay. Furthermore, the avoidance

in Togo Kan of lexical /HL/ on prosodically light adjectives and common nouns does not extend to noun-like postpositions, where /HL/ is actually predominant (*X gírè* 'in front of X', *X kúⁿ* 'on/over X', cf. nouns *gìré* 'eye(s)' and *kúⁿ* 'head'). The avoidance also does not extend to place names (*górò*, a village), adverbs (*nî* 'here'), verbs (*pórì* 'say'), or unclassified elements (*jíjɛ̀* 'going along with'). We know of no evidence in Togo Kan for a shift of synchronic lexical /CV́CV̀/ to CV́CV́. We therefore reject a phonological solution to the weight-based overlay split, and conclude that the choice between {H} and {HL} in Togo Kan is made in the tonosyntax itself, based on calculation of the prosodic heaviness of the possessed noun.

7.3. LINEAR ADJACENCY. With rare exceptions that may be due to movement, tonosyntactic processes involve adjacent controllers and targets. We therefore now consider whether constraint 32 is justified as part of the ontology of Dogon tonosyntax.

(32) ADJACENCY CONDITION (proposed): A tonosyntactic controller may only target an adjacent word or word string.

Constraint 32, either as stated here or as reformulated in terms of arboreal locality, is arguably valid for most Dogon languages. It works well for adjectives and demonstratives, but also for relative clauses if the downward/rightward-movement model for overt head NPs is accepted; see §4.1 above. There is a striking lack of long-distance tonosyntactic control; for example, N-Num-Dem is never realized as [N^{L} Num Dem] with the demonstrative controlling just the nonadjacent noun. However, there are a few possible exceptions that must be closely analyzed.

GENITIVE MORPHEMES WITH PRENOMINAL POSSESSORS. In most Dogon languages, nonpronominal possessors always immediately precede, and control tone overlays on, following possessed NPs; see §4.2 above. There are, however, three Dogon languages in which possessor and possessed NPs are or can be separated by an intervening genitive morpheme: [Poss GEN NP]. Does the genitive morpheme block L-to-R tonosyntactic control by the possessor on the possessed NP?

In Jamsay, the answer is yes. All possessors in this language are preposed. Inalienables (i.e. kin terms) have the typical Dogon possessive construction with adjacent possessor and possessed noun and with an overt possessor-controlled tone overlay, which is {HL} in Jamsay. The Jamsay inalienable formula is therefore [Poss ^{HL}N], as in 33, with lexically /LH/-toned *dě:* 'father' becoming ^{HL}*dê:*.

(33) séydù ^{HL}dê:
Seydou ^{HL}father
'Seydou's father' (< *dě:*) (Jamsay, inalienable possession)

By contrast, the Jamsay formula for alienable possession is [Poss *mà* N], with genitive linker *mà* expressing the possessive relationship, and NO OVERLAY on the possessed noun, as in 34, where *úró* 'house' preserves its lexical melody. Jamsay obeys the adjacency condition in 32 above.

(34) séydù mà úró
Seydou GEN house
'Seydou's house' (Jamsay, alienable possession)

There are two other languages in our sample that allow intervening genitive elements, but in these languages they are optional. In Tommo So, possessive enclitic *=mɔ* is optionally attached to a preposed possessor, chiefly in the speech of older people. The possessor-controlled overlay in this language is {L}, so the formula without the enclitic is [Poss ^{L}N]. When the genitive enclitic is present, older speakers vary as to whether it

blocks the overlay. In this case, the formula varies between [Poss=*mɔ* ᴸN] as in 35a, where 'war' is tone-lowered, and [Poss=*mɔ* N] as in 35b, where 'ashes' preserves its lexical melody.

(35) a. mɔ́ɔ́lu=mɔ ᴸjàw
Mori=GEN ᴸwar
'the war of Mori (village)' (*jáw*) (Tommo So, older speakers)

b. bènjù-ámbìèm=mɔ úndɔ́=gɛ
Benju-Ambiem=GEN ashes=DEF
'Benju-Ambiem's ashes' (Tommo So, older speakers)

Tommo So =*mɔ* is less common in the speech of younger people, but when they repeat utterances from older speakers they consistently tone-lower the possessed noun, so 'ashes' lowers its tones and appears as *ùndɔ̀=gɛ* in their version of 35b. For the younger speakers, there is a single basic formula [Poss(=*mɔ*) ᴸN], where the optional and rather uncommon enclitic does not block tone-lowering. Tommo So older and younger speakers are presumably at different stages in the diachronic shift from an original Jamsay-like system to a more typical Dogon system with direct juxtaposition and obligatory tone overlay.

The situation in Yanda Dom resembles that of Tommo So, but with a few twists. For preposed possessors, the regular formula is [Poss ᴸN] if the possessor has a determiner as in 36a, but [Poss ᴴN] if the possessor is undetermined, for example, a bare noun as in 36b. A morpheme *ŋ̀* can intervene, and in this case the formula is [Poss *ŋ̀* ᴸN] even when the possessor is a bare noun, as in 36c. Tonosyntactically, [Poss *ŋ̀*] behaves like a determined NP for purposes of controlling {L} on the possessed noun. Indeed, 36c occurs in an animal tale where *zɔ̀mɔ́* 'hare' denotes a specific character, rather than a nonspecific indefinite. In any event, the presence of *ŋ̀* does not block control.

(36) a. [zɔ̀mɔ́ gɛ̀] ᴸmɛ̀nɛ̀
[hare DEF.AN.SG] ᴸfield
'the hare's field' (Yanda Dom)

b. zɔ̀mɔ́ ᴴmɛ́nɛ́
hare ᴴfield
'(a) hare's field' (Yanda Dom)

c. [zɔ̀mɔ́ ŋ̀] ᴸmɛ̀nɛ̀
[hare GEN] ᴸfield
'hare's field' (Yanda Dom)

So an overt genitive morpheme between possessor and possessed blocks tonosyntactic control in Jamsay, but not in Yanda Dom and only inconsistently among older speakers in Tommo So. The key factor seems to be that Jamsay *mà* is a GENITIVE LINKER that cannot occur when either possessor or possessed is zeroed. In particular, when the possessed NP is blank ('mine', 'Seydou's __ '), a slightly irregular expletive noun *cé* 'possession' (originally 'thing') is required in Jamsay, and the construction is treated as inalienable (i.e. there is no *mà*), as in 37a. By contrast, Tommo So =*mɔ* and Yanda Dom *ŋ̀* are not only allowed, but also required, when the possessed NP is blank, as in 37b–c.

(37) a. séydù cé
Seydou possession
'Seydou's __ ' (Jamsay)

b. bènjù-ámbìèm=mɔ __
Benju-Ambiem=POSS
'Benju-Ambiem's __ ' (Tommo So)

c. [zɔ̀mɔ́ ŋ̀] __
[hare POSS]
'hare's __ ' (Yanda Dom)

These facts show that the Tommo So and Yanda Dom possessive morphemes are PART OF THE POSSESSOR NP, as indicated by our bracketing, while Jamsay *mà* is a genitive linker that cannot be bracketed asymmetrically with either the possessor NP or the possessed NP. These facts suggest that the adjacency condition is generally valid. Jamsay *mà* separates the possessor from the possessed, blocking tonosyntactic control. Tommo So *=mɔ* (usually) and Yanda Dom *ŋ̀* are part of the possessor, so the possessor is adjacent to the possessed noun and control is possible.

CLITIC-LIKE PRONOUNS. However, there are three constructions in Tommo So involving H-toned clitic-like pronominals that can intervene between a controller and a tone-lowered target, or between two words that are tone-lowered by one controller. Let X be the clitic, and let C and T be controller and target. The formulae for the exceptional cases are then [T^L X C] and [$T_1{}^L$ X $T_2{}^L$ C], where X preserves a lexical tone melody that contains an H-tone, such as /H/, /LH/, or /HL/. We present the data, then suggest two possible accounts for all three cases: (i) clitic-like pronominals idiosyncratically resist tone-lowering, and (ii) tone-lowering applies before the pronouns move into their surface position.

In Tommo So, N-Adj-PronPoss with a postnominal pronominal possessor (§4.2) is optionally inverted to N-PronPoss-Adj, an inversion that we to date have observed in no other Dogon language. Since adjectives are R-to-L controllers while postposed possessors are not, we (correctly) expect an output [N^L Adj PronPoss] in the absence of inversion. After inversion, if the adjacency condition is enforced, we expect the output to be either [N^L PronPoss^L Adj] with both noun and possessor tone-lowered, analyzable as [[N PronPoss]^L Adj], or else [N PronPoss Adj] with the possessor forming a tonosyntactic barrier, escaping tone-lowering and protecting the noun from being tone-lowered.

The actual output is neither of these, but rather [N^L PronPoss Adj], where the pronominal possessor resists tone-lowering but does not prevent the adjective from tone-lowering the noun. Examples 38a and 38b illustrate the uninverted and inverted outputs, respectively. The key point is that 'donkey' is tone-lowered in 38b, though it is separated from the controlling adjective by a pronominal possessor that contains an H-tone.

(38) a. jàndùlù^L pílu wómɔ
donkey^L white 3SG.POSS
'his/her white donkey' (Tommo So)
b. jàndùlù^L wómɔ pílu
donkey^L 3SG.POSS white
'his/her white donkey' (Tommo So)

Example 38b appears to violate the adjacency condition in 32 (but see below).[20]

[20] In the Tommo So combination [N^L PronPoss Dem], as in (i) below, the demonstrative controls {L} on the nonadjacent noun, but does not affect the H-tone of the intervening possessor. This apparently violates the adjacency condition in the same way as 38b. There is an alternative tonal output (ii), where the noun preserves its lexical tones while the demonstrative lowers its tone.

(i) gàmmà^L wómɔ ní
cat^L 3SG.POSS this
'this cat of his/hers' (Tommo So)

Another Tommo So example of the same general type occurs in relative constructions. Consider the sequence [… [head]^{L} … verb.Ppl Dem], where a verbal participle is followed by a demonstrative.[21] We may disregard the {L} overlay on the internal head NP, which was dealt with in §4.1 above. Since demonstratives control tone-lowering, the output is [… [head]^{L} … verb.Ppl^{L} Dem].

We now complicate the verb complex in this combination. Progressive aspect in Tommo So main clauses is expressed by adding an inflected 'have' auxiliary to a form of the main verb ending in a progressive suffix. In relatives with a demonstrative, both verbs are tone-lowered, as in [… [head]^{L} … verb-Prog^{L} have.Ppl^{L} Dem], possibly analyzable as [… [head]^{L} … [verb-Prog have]^{L} Dem]. If it is a nonsubject relative with a pronominal subject, the subject is expressed by a proclitic pronoun that either precedes both verbs or intervenes between the main verb and the auxiliary. This subject pronoun is lexically H-toned, and it is not tone-lowered even when it does intervene. Example 39a is a main clause with progressive aspect and with the 1SG subject suffix added to the 'have' auxiliary, while 39b shows what happens to it as a nonsubject relative in the case where the proclitic subject pronoun intervenes between the main verb and the auxiliary. In 39b, both 'speak' and 'have' are tone-lowered by the demonstrative, but the 1SG subject is H-toned *mí*. Example 39c shows the alternative ordering with the pronoun preceding the main verb.

(39) a. [àn-nà^{L} nɔ̀]=lé sɔ́ɔ́ sɔ́ɔ́-gú=sɛ-m
[man-HUM.SG^{L} this]=ASSOC speech speak-PROG=have-1SG.SUBJ
'I am speaking to this man.' (Tommo So)

b. àn-nà^{L} sɔ́ɔ́ sɔ̀ɔ̀-gù^{L} mí sɛ̀^{L} nɔ́
man-HUM.SG speech speak-PROG^{L} 1SG.SUBJ have.PPL^{L} this
'this man who(m) I am speaking to' (Tommo So)

c. àn-nà^{L} sɔ́ɔ́ mí sɔ̀ɔ̀-gù^{L} sɛ̀^{L} nɔ́
man-HUM.SG speech 1SG.SUBJ speak-PROG^{L} have.PPL^{L} this [= 39b]

Example 39b raises the same issues as 38b above. The controller 'this' in 39b appears to have a divided target consisting of 'speak' and 'have' but not the intervening subject pronoun.

The Tommo So examples that are problematic for the adjacency condition are therefore [N^{L} PronPoss **Adj**] as in 38b and [V^{L} PronSubj Aux.Ppl^{L} **Dem**] as in 39b, where in each schema the controller is highlighted. There are two ways to reconcile these examples with the adjacency condition. First, we could say that Tommo So clitic-like pronominals idiosyncratically resist tone-lowering even when they occur medially in a tone-lowering domain; compare the island phenomena mentioned in §8.1 below. (Some other Dogon languages, however, do allow tone-lowering of pronominals.) Alternatively, we could argue that these pronominals move into the relevant position only after tone-lowering has applied to a target adjacent to the controller. In the latter interpretation, the variants 38b and 39c are generated and undergo tone-lowering, respecting the adjacency condition. Then the pronominals optionally move into the position between controller and target (38a) or into the middle of the target domain (39b).

(ii) gámmá wómɔ ^{L}nì
cat 3SG.POSS ^{L}this
'his/her white donkey' (Tommo So)

We do not analyze these examples further, since the syntactic analysis of postnominal possessor pronominals is too complex to attempt here; see §4.2 and especially n. 15.

[21] Tommo So does not have overt participial morphology on relative clause verbs, so 'participle' here is used loosely.

7.4. SUMMARY OF §7. Tonosyntactic processes have access to limited aspects of the input phonological structure of possessors (final tone) and of possessed nouns (prosodic weight). This phonological information does not affect controller-target relationships, but it can affect the choice among alternative overlays associated with a given controller (specifically, possessors).

The adjacency condition is clearly satisfied in most Dogon languages. The case can be made that it is satisfied in all languages in our sample, but this depends on how we bracket genitive morphemes, and on how we analyze clitic-like pronominals in Tommo So.

8. CONCLUSION. We first outline a program for further study of the mechanics of Dogon tonosyntax, and then discuss the theoretical significance of the ontology of this tonosyntax, with special reference to interface models, in §8.2.

8.1. A RESEARCH PROGRAM FOR DOGON TONOSYNTAX. The syntactic and semantic basis of Dogon NP tonosyntax, as illustrated here mainly with Ben Tey data, is equally valid for most other Dogon languages. Adjectives, demonstratives, and relative clauses are R-to-L controllers, prenominal possessors are L-to-R controllers, and nonsingular quantifiers and DF markers are noncontrollers. The languages do differ as to whether input phonological features affect choice among overlays, for example, {HL} versus {L}. Nouns are prototypical targets.

However, we have also seen that postnominal words (adjectives, numerals) can be included along with nouns in target domains, as in N-Num-Dem realized as [[N Num]^{L} Dem]. Subsequent articles will shift the focus from ontology to mechanics, studying how strings including two, three, or four prospective controllers resolve conflicts among them. Consider 40a,b from Jamsay. The stems are lexically *dě:* 'father', *nèrⁿɛ́* 'paternal aunt', and *kúróy* 'six'.

(40) a. [mì ^{HL}dê:] ^{HL}nérⁿè kúróy kùⁿ
[1SG.POSS ^{HL}father] ^{HL}aunt six DEF
'my father's six paternal aunts' (Jamsay)

b. [mì dè:]^{L} nèrⁿè^{L} kùròy^{L} nùŋò-nám
[1SG.POSS father]^{L} aunt^{L} six^{L} DEM-HUM.PL
'these/those six paternal aunts of my father's' (Jamsay)
(tonosyntactically bracketed [*mì dè: nèrⁿè kùròy*]^{L} *nùŋò-nám*])

Possession here is recursive. In 40a, 'father' has {HL} overlay controlled by the 1SG pronoun, and 'aunt' has the same {HL} overlay controlled by 'my father'. The numeral and the definite morpheme are tonosyntactically inert. In 40b, the definite morpheme is replaced by a demonstrative, that is, by an R-to-L controller. It casts an {L} overlay over the entire string 'father-aunt-six', among other things erasing (or otherwise blocking) the two possessor-controlled {HL} overlays. Things could have been otherwise, and in some other Dogon languages the possessor-controlled overlay erases (or blocks) the demonstrative-controlled overlay.

Even the simple two-controller string [Poss N Dem] (e.g. 'this cow of Seydou's') has four theoretically possible outputs in a language with possessor-controlled {HL} and demonstrative-controlled {L}, as schematized in 41.

(41) a. [Poss ^{HL}N Dem]
b. [Poss ^{HL}[N Dem]], realized as [Poss ^{HL}N ^{L}Dem]
c. [Poss N^{L} Dem]
d. [[Poss N]^{L} Dem], realized as [Poss^{L} N^{L} Dem]

Dogon languages differ as to which output is grammatical. The parameters are: first, whether the possessor (41a,b) or the demonstrative (41c,d) controls the overt overlay on

the noun, and second, whether the domain of the overt overlay is limited to the adjacent noun (41a,c) or also extends beyond the noun to include the unsuccessful would-be controller (42b,d).

Aside from conflicts where one controller wins outright and another loses, certain Dogon languages have additional complexities: islands, edge tones, bidirectional control, relays, and tone rhythms. Let T = target, C = controller, and R = relay. ISLANDS, symbol ⊂…⊃, are cases where words in an inner string are tonosyntactically frozen and are unaffected by more external would-be controllers, as in $[\subset T^{L}\ C_1 \supset\ C_2]$ where C_2 fails to control tones on C_1. EDGE TONES (shown with +) are peripheral add-ons to regular word-level overlays, as in $[[T_1\ T_2 \dots\ T_n]^{L+H}\ C]$ realized as $[T_1{}^{L}\ T_2{}^{L} \dots\ T_n{}^{L+H}\ C]$ with the extra H-tone confined to the final syllable or mora of the target string. BIDIRECTIONAL CONTROL is exemplified by $[C_1{}^{HL}[T_1\ T_2 \dots\ T_n]^{L+H}\ C_2]$ realized as $[C_1{}^{HL}T_1{}^{L}T_2{}^{L} \dots\ T_n{}^{L+H}\ C_2]$, where each flanking controller accounts for an H-tone at the adjacent edge of the target string. In this example, the L-toned sequence in the middle of the target string is ambiguously (or doubly) controlled, as implied by the intentionally fence-sitting notation ${}^{L}T_2{}^{L}$. RELAYS occur in constructions like $[[T^{L}\ R]\ C]$ or $[[T^{L}\ R^{L}]\ C]$, where T is tone-lowered by C only in the presence of R, hence not in [T C]. A few Dogon languages, including Yanda Dom and Tomo Kan, have TONE RHYTHMS, that is, alternations of H- and L-tones reminiscent of alternating-stress rhythms, and these rhythms may interact in a complex way with tonosyntax.

8.2. INTERFACE MODELS. Prosodic phonology is focused on multiword phrases, but does not recognize stem-class labels. Construction morphology is focused on single words, but does recognize that labeled stem classes play a role in (morpho)phonology. To account for the Dogon data, we need to cross-breed the phrasal scope of prosodic phonology with the ontology of construction morphology.

TONOSYNTAX AND THE PROSODIC HIERARCHY. Prosodic phonology (Selkirk 1978, 1980, 1984, Nespor & Vogel 1986) is a highly developed theory of how ontologically discrete syntactic and phonological modules interact; for a review of its various incarnations see Selkirk 2011. In this model, phonological rules cannot make direct reference to labeled syntactic constituents (e.g. noun, NP, clause). Rather, such rules are sensitive to edges of prosodic constituents at three hierarchically ordered levels (word, phonological phrase, intonational phrase) that align with edges of corresponding syntactic levels, subject to some adjustments (e.g. a prosodic distinction between non-branching and branching syntactic constituents). Otherwise unbounded directional processes such as spreading of a constituent-internal tone may be stopped at or near an edge. Directional processes emanating from outside a constituent may be blocked from penetrating into it. Local phonological processes such as segment lengthening may occur at or near an edge. Current models of prosodic phonology can distinguish lexically headed XPs, which regularly correspond to prosodic constituents, from nonlexically headed XPs, which may not.[22]

[22] Much internal debate within this theory has been about how close the correspondence is between syntactic and prosodic constituents, and about issues of recursion. Different versions have claimed that each language aligns either the left or right edges but not both (alignment theory, Selkirk 1986, 1996), or that both left and right edges are aligned (match theory, Truckenbrodt 1995, 1999). Alignment theory is compatible with a strict, nonrecursive hierarchization of prosodic constituent levels. This is untenable in match theory, which requires a stronger correspondence between syntactic and prosodic phrases. Additional questions have been raised about the role of tonal sandhi in prosodic phonology (Kenstowicz 1987, Schuh & Gimba 2005).

Prosodic phonology has encountered semantics chiefly in connection with attentional issues. Discourse backgrounding (givenness) depresses stress prominence, whereas focalization enhances stress prominence, though some issues remain controversial (Selkirk 1984, Vogel & Kenesei 1987, 1990; cf. Bolinger 1972). Backgrounding and focalization play little or no role in Dogon NPs, so we disregard them here.

Prosodic phonology generally works well for languages like English, but not for Dogon. The main obstacle is the theory's claim that prosodic phonology cannot recognize labeled syntactic categories such as noun, verb, and adjective, or their respective projections. The assumption is that syntax and phonology are so distinct ontologically that their interface is sharply restricted. This is clear, for example, in the rules for phonological phrase formation summarized in Kanerva 1990. Critics argue that stem-class information must at times be smuggled in, even though it weakens the theory (Hyman 1990).

In Dogon, tonosyntax revolves almost entirely around specific stem classes and their reference-restricting properties. It can even make subtle semantic distinctions between members of well-defined functional categories. Demonstratives and definites are standardly assigned to the same functional class (determiners, or D-determiners in technical semantic terms). However, some Dogon languages distinguish the two tonosyntactically even when they are very similar or, as in Najamba, identical in form (21a,b above).

Instead of stem-class and functional labels, phrasal edges play the central role in prosodic phonology. Edges are merely outer limits in Dogon tonosyntax, where tone overlays such as {L} generally extend over entire words or word strings. The fact that the overlays are imposed by controllers that are external to target domains also has no clear analogue in prosodic phonology.

So we have two choices. One is to significantly weaken prosodic phonology to allow it to account for Dogon tonosyntax, recognizing controller-target relationships, stem classes, reference restriction, and (multi)word-level overlays, not to mention the exotic mechanical issues sketched briefly in §8.1. The other is to argue that Dogon tonosyntax is sui generis, that is, ontologically distinct from the substance of prosodic phonology.

Construction morphology. Theories that do recognize a role for labeled stem classes and for dependencies similar to our controller-target relationships are generally morphological rather than syntactic in scope. Precompiled phrasal phonology, launched by Hayes (1990) but not actively developed since, was of this type. It argued that stems have multiple allomorphs that are available for activation in particular morphological or syntactic contexts ('instantiation frames'). To apply this to Dogon NPs, we could say that each stem (noun, adjective, numeral) has a precompiled set of tonal variants, some of which are activated by external controllers. The tonal variants (except the lexical melody) can be generated by lexical rules like $N \rightarrow N^{L}$, $Adj \rightarrow Adj^{L}$, and $Num \rightarrow Num^{L}$ in the frame [__ Dem]. One could improve this as $X \rightarrow X^{L}$ where X is a variable over {N, Adj, Num}. The focus on individual words, however, would result in a clumsy multistep analysis of multiword target domains, as in 41b above, schematically [[Poss N N Num]^{L} Dem], which would require at least three independent iterations of $X \rightarrow X^{L}$.

A more recent model of the same general type is construction morphology (Booij 2010). It is based on schemas, such as the English deverbal agentive $[X_i \text{ -}er]_{Nj}$, which is instantiated by, for example, *buy-er* (Booij 2010:84). The morphological change can be stem-internal (ablaut, tonal) as well as affixal, so for Dogon we could posit various schemas like [X^{L} Dem]. Like Hayes's model, this is basically about single words, though

it extends to compounds and some 'tight' phrasal constructions. It will have to be extended to account for the tonosyntactic subtleties of multiword NPs, as in 41b above.

CONSTRUCTION MORPHOSYNTAX? What we need, then, is a framework that can readily deal either with single words or with multiword strings, somewhat as in prosodic phonology, hybridized with the constructional element in the morphological models just discussed.

To summarize, Dogon NP tonosyntax consists of operations whereby syntactically defined controllers impose word- or multiword-level tone overlays on syntactically defined targets. There is an overarching semantic basis for controller status, viz. reference restriction, which divides an open set into two subsets consisting respectively of excluded and (potentially) included individuals. Tonosyntactic operations can make reference to input phonological features (edge tone of controller, prosodic weight of target), but only for purposes of choosing between two or more variant overlays for the same controller. Target domains must be adjacent to controllers, with a few apparent exceptions that might be explained by the bracketing of genitive morphemes and by allowing post-tonosyntactic pronominal-clitic movement. In other words, tonosyntactic processes require access to syntax (labeled stem classes), semantics (reference restriction), linear order, and input phonological features. No model of grammar that sharply restricts content visibility across modules can account for these phenomena.

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