

A Syntactic Alignment Account of Sentential Stress in English

Jeremy Perkins
Rutgers University

1. Introduction

This paper offers an account of sentential prominence in English based on whether or not a given syntactic constituent is in-situ or whether it has undergone movement. A syntactic feature, [PROM], is posited and is associated with a syntactic constituent via an Optimality Theoretic (Prince & Smolensky, 1993; 2004) constraint ranking. The location of sentential stress is accounted for via a constraint that bans syntactic constituents containing null elements from being prominent. As a result, in-situ constituents are preferably prominent as opposed to those that have moved. Unlike other accounts that utilize phase domains (Legate, 2003; Kratzer & Selkirk, 2005; Kahnemuyipour, 2009), this account requires no reference to syntactic phases. Instead standard assumptions on movement are relied upon.

The location of sentential prominence in English has three subclasses: The default position is rightmost in the clause, as seen in declarative sentences (Main prominence is denoted by use of caps throughout).

- (1) a. Bill RAN
- b. #¹ BILL ran

However, in cases where a clause-final constituent is moved to a non-clause-final position, that constituent is prominent in its overt position. Prominence is assigned to it based on the location of the lower copy of the movement chain then. This behaviour is exhibited in passives, unaccusatives, and movement of heads of restrictive relative clauses (Bresnan, 1972). Even *wh*-movement exhibits this shift in prominence. The following example illustrates one such case for a passive construction:

- (2) a. A BALL was kicked <the BALL>
- b. # A ball was KICKED <the ball>

The final layer to the generalization can be seen in cases where a direct object moves in a restrictive relative clause with a ditransitive verb.

- (3) a. I like the book that Bill gave JOHN <gave> <the book>
- b. # I like the BOOK that Bill gave John <gave> <the BOOK>

¹ Here and throughout, when a sentence is marked as infelicitous, it is implied that it's infelicitous with the whole clause under focus. In these infelicitous cases, the only felicitous reading should have contrastive focus on the stressed word.

In this case, rather than the moved object being prominent, the surface-final in-situ object is prominent.

Summarizing the generalization, rightmost syntactic constituents, including null copies, attract sentential prominence. However, there is a preference for in-situ constituents to be prominent in comparison to those that are parts of chains, as seen in (3) above.

The rightmost preference for sentential stress is captured by the relative ranking of alignment constraints (McCarthy & Prince, 1993) such that ALIGN (MC, R, [PROM], R) outranks ALIGN (MC, L, [PROM], L). In cases like the passive, where movement has occurred from a rightmost position, the copy theory of movement (Nunes, 1995) is employed to explain the non-final surface prominence. This is the case because ALIGN (MC, R, [PROM], R) is satisfied by a [PROM] chain, whose lower null copy is rightmost in the clause.

The preference for prominence on in-situ constituents is captured via a novel constraint, *Null [PROM], that is violated whenever a chain containing a null syntactic element is prominent. The intuitive basis of this constraint is that prominence is something that is ideally overt, and so any structure that has a null element that is assigned prominence, even a null copy in a chain, is relatively more marked. This preference for non-null prominence accounts for the location of the main prominence in cases where a direct object moves in a restrictive relative clause with a ditransitive verb, such as (3) above. By ranking *Null [PROM] above ALIGN (MC, R, [PROM], R), in-situ syntactic constituents are preferably prominent, rather than those that have moved. It is argued that this explanation extends to cases of wh-movement and movement out of restrictive relative clauses. It also can explain prominence patterns seen with adverbs, occurring both in medial and final positions in the clause.

Regarding the data used in this paper, it should be noted that the full set of facts are not yet clear. For instance, prosodic effects are noted in section 2.8, that are not yet fully understood. These effects are controlled for by limiting the English data to sentences containing only monosyllabic verbs and nouns. This account is limited to English uniclausal declaratives with intransitive, transitive and ditransitive verbs. The account also covers cases of movement in restrictive relative clauses, passivization and arguably wh-movement.

While it is true that any word in a sentence can potentially be prominent, since it is possible to focus any particular constituent in a sentence, a unique “default” position of prominence exists. Contrastive focus on some XP places sentential prominence on that focused XP (Gussenhoven, 1983; Ladd, 1983). However, the OT account is only concerned with the location of the default prominence. The default position can be elicited by creating a context that disallows focus on particular constituents, instead placing the entire clause in focus. For example, in response to the question “What happened?” the only felicitous response is “Bill kicked the BALL”, where “ball” is judged as the most prominent word in the sentence. An alternative response that places the main prominence on “Bill” is infelicitous in response to “what happened?” since it

implies the presence of contrastive focus on “Bill”. The same does not hold though when “ball” is most prominent: There is no implication of some other salient object that Bill did *not* kick. This illustrates a “default” rightmost prominence, independent of the details of focus. While focus has an important additional contribution to the location of prominence, it is removed as a variable here. This account focuses only on the default location of sentential prominence.

The data provided here are based on the judgments of two native English speakers, one being the author who speaks western Canadian English and another who speaks British English. Judgments on location of sentential prominence are controversial and so the account here is meant to explain a certain set of judgments shared by two English speakers that appear to constitute a cohesive pattern. It is therefore, only a preliminary account, that can only be verified once more data, both in English and, more importantly, in other languages, are included. The judgements of prominence location are more tenuous than most grammaticality judgements due to the fact that prominence is determined not only in the syntactic and phonological components, but is also an important part of information structure: Almost all possible positions of sentential prominence are grammatical in one context or another. It is a difficult task to completely remove these effects. Despite these difficulties, this paper extracts a generalization of default sentential prominence in English and lays out an OT account to explain it.

In section 2, the analysis is presented. First, constraint definitions as well as assumptions on syntactic representations are laid out. The full array of English examples are then shown, with a demonstration of how the OT account can account for the prominence positions for each. Alternative accounts that refer to syntactic phases are discussed and compared to the OT account in section 3. Section 4 is the conclusion.

2 An OT Account of Sentential Stress

Five markedness constraints can account for which syntactic constituent has sentential prominence. Two of these constraints, *Null [PROM] and Unary [PROM] are novel to this account. The location of the feature [PROM], ultimately determines which prosodic word carries the main prominence within a sentence, and as such its location is the focus of this account. These constraints together determine which syntactic constituent is [PROM]. Notably, [PROM] is not a lexical feature, so it is not specified in the input, and thus faithfulness constraints play no role.

(4) *Null [PROM]: This constraint is violated once per syntactic chain (XP or X^0) that is [PROM] and that contains or dominates at least one syntactic element that is phonologically null.

(5) Lexical Category Condition (LCC): This constraint is violated once per functional syntactic chain that is [PROM].²

² In Truckenbrodt (1999) (see also Selkirk, 1995a), prosodic structure is aligned with lexical XP’s, not functional XP’s. In Truckenbrodt’s account, the LCC is built in to the

- (6) Unary [PROM]: This constraint is violated when a [PROM] constituent contains more than one X^0 . One violation is incurred per extra X^0 , with no violations if there is only a single X^0 .
- (7) ALIGN (MC, R, [PROM], R): This constraint ensures that for every MC³, there must be at least one syntactic constituent that is [PROM] such that there is no X^0 intervening⁴ between the right edge of the MC and the right edge of the syntactic constituent that is [PROM]. One violation is incurred per intervening X^0 (see Edgemost; McCarthy & Prince, 1993: 14).

A left-oriented version of the alignment constraint, ALIGN (MC, L, [PROM], L), is also used in the account, although it is never active.⁵

The following ranking diagram illustrates the required ranking for the observed pattern of sentential stress in English:

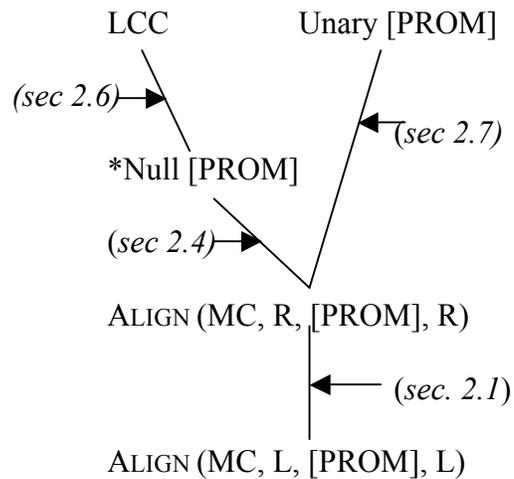
constraints that align XP's with φ 's. Sentential prominence can then be derived via constraints that align head prosodic constituents. This OT account states the restriction against prominence in functional XP's directly, banning the feature [PROM] in functional syntactic constituents via the violable LCC constraint.

³ It would also be possible to define this constraint with the quantification reversed: "For every [PROM] syntactic constituent, there is a MC such that..." This follows because of a stipulation made in GEN that there is exactly one [PROM] feature per MC. Ideally, this would not need to be stipulated and would be derived in the constraint ranking. One way to do this would be to include an undominated constraint violated whenever there is any number other than one [PROM] constituent, within a MC.

⁴ ALIGN (MC, R, [PROM], R) potentially prefers syntactic structures containing fewer X^0 's as well then since these constitute violations as interveners. It can potentially prefer candidates with fewer null X^0 's as a result. It is unsurprising that a constraint might exist that prefers structures with fewer null X^0 's to those with more null X^0 's. However, it would be surprising if a constraint on alignment of prominence were the relevant constraint.

⁵ It is possible that there is only a rightward alignment constraint and that ALIGN (MC, L, [PROM], L) does not exist. This is a question for a typological study: If there are languages that show the mirror image, leftmost prominence, then this would amount to evidence that ALIGN (MC, L, [PROM], L) should be included in CON. In the analysis of English, it is inactive. I include ALIGN (MC, L, [PROM], L) in the tableaux that follow to show that if it were present in CON, it must be outranked by the other three constraints.

(8) Ranking for Sentential Stress in English



This OT analysis was investigated within OT Workplace (Prince & Tesar, 2010). Some simplifications in representations of candidates were made to enable the writing of scripts that assessed constraint violations. See Appendix B for the macros used to assess constraint violations.

Prior to exploring how the constraint ranking derives the pattern of sentential stress in English, a short discussion of GEN is helpful. GEN supplies candidates with a fixed syntactic structure specified in both input and output. Prosodic structure is specified only in the output, but the OT account does not require any particular theory of prosody, and thus prosodic structure will not be illustrated in the candidates. The [PROM] feature is interpreted as the head prosodic word (ω) of the head phonological phrase (φ) in a given intonational phrase (ι). This is done in GEN by ensuring that the head ω of the head φ in a given ι corresponds to the syntactic constituent that is [PROM]. This notion of correspondence is defined in Appendix A.

The [PROM] feature is only interpretable in the phonological component when its host syntactic constituent corresponds to some prosodic constituent. A minimalist approach would state that occurrences of [PROM] on constituents without a prosodic correspondent would crash. In an OT account, this is encoded in GEN: candidates are not generated where [PROM] cannot be spelled out phonologically. Since prosodic constituents define which material is ultimately pronounced, this means no candidates are generated with a [PROM] constituent that is phonologically null.

I assume that a unique [PROM] constituent exists within each main clause (MC), where the MC is the highest node in syntactic (clausal) structure. Candidates are generated allowing this feature to be assigned to any XP or X^0 in the output. This is in fact the only difference between the candidates under consideration. The location of [PROM] will be determined via the ranking of the five markedness constraints introduced above.

The following sections demonstrate how the constraint ranking above captures the pattern of sentential stress in English. Section 2.1 handles the default cases, where the prominence is at the right clause edge. This is captured by ranking ALIGN (MC, R, [PROM], R) above ALIGN (MC, L, [PROM], L). Sections 2.2 and 2.3 shows that this same ranking predicts that sentential prominence is not surface-final when a clause-final constituent moves to a non-clause-final surface position. Section 2.2 shows how this applies to movement of subjects in unaccusatives and passives. Section 2.3 shows how this also can be applied to wh-movement. Section 2.4 shows that *Null [PROM] must dominate ALIGN (MC, R, [PROM], R) in order to capture the effect that in-situ constituents are prominent, even when a better right-aligned chain is available. This is illustrated via movement of indirect objects in restrictive relative clauses. Section 2.5 shows that this same ranking can account for shifts in sentential prominence seen when adding manner adverbs. Sections 2.6 and 2.7 give the candidate comparisons that establish the relative rankings of the constraints, Unary [PROM] and the LCC. Section 2.8 illustrate some examples that the OT account cannot predict. These exceptions suggest that prosody plays a significant role in the determination of sentential stress.

2.1 Rightmost Sentential Prominence

First, consider intransitive and transitive sentences. The main prominence is on the final stressable word in English⁶:

- (9) a. Bill RAN
b. # BILL ran
- (10) a. Bill ran in the PARK
b. # BILL ran in the park
c. # Bill RAN in the park
- (11) a. Bill chased JOHN
b. # Bill CHASED John
c. # BILL chased John
- (12) a. Bill chased John in the PARK
b. # Bill chased JOHN in the park
c. # Bill CHASED John in the park
d. # BILL chased John in the park
- (13) a. Bill gave John a GIFT
b. # Bill gave JOHN a gift
c. # Bill GAVE John a gift
d. # BILL gave John a gift
- (14) a. Bill gave a gift to JOHN
b. # Bill gave a GIFT to John
c. # Bill GAVE a gift to John
d. # BILL gave a gift to John

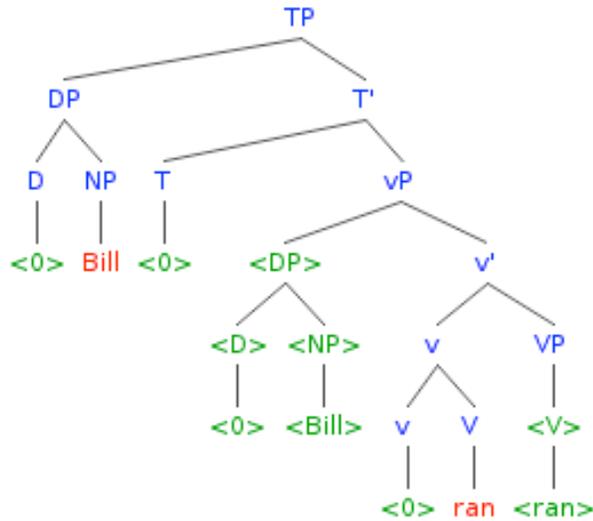
⁶ Throughout the analysis, I use monosyllabic nouns and verbs in order to control for prosodic effects. See section 2.8, for some evidence showing a potential role that prosody plays in determining the location of sentential prominence.

- (15) a. Bill gave John a gift in the PARK
 b. # Bill gave John a GIFT in the park
 c. # Bill gave JOHN a gift in the park
 d. # Bill GAVE John a gift in the park
 e. # BILL gave John a gift in the park

Whether the final word is the main verb (as in (9)), an object of a transitive (as in (11)), an object of a ditransitive (as in (13) and (14)), or part of an adjunct (as in (10), (12) and (15)), it is more prominent than all other words in the sentence. Generalizing over these examples, in any sentence consisting of a string of lexical XP's, the final of these is more prominent than any other. This rightmost default for prominence is captured by ranking ALIGN (MC, R, [PROM], R) above ALIGN (MC, L, [PROM], L).

Prior to showing how the account predicts the rightmost default for sentential stress, consider what candidates are generated in this OT system. A simple unergative case is given in (9), "Bill ran". I assume the following structure for unergatives:

(16) Assumed Structure for Intransitive Sentences



This structure serves as the input, and all candidates will preserve this syntactic structure.⁷ The only difference that can occur between candidates is in the position of the [PROM] feature.

Simplified⁸ linear representations are included in tableaux:

⁷ This is not to say that other constraints could not have a say on what structure is selected optimally. The system here is only meant to locate prominence, given a syntactic structure. It would be interesting to look at the interaction of the prominence-determining constraints and constraints on the structure itself, but this is outside the scope of this paper.

(17) $\langle D^0 \rangle$ Bill $\langle T^0 \rangle$ $\langle D^0 \rangle$ $\langle \text{Bill} \rangle$ $\langle v^0 \rangle$ ran $\langle \text{ran} \rangle$ ⁹

A complete list of all of the candidates generated for the input in (16) is given below in (18). I illustrate the location of [PROM] here by enclosing the [PROM] constituent in parentheses and by placing it in bold font.

(18) Candidates generated for the sentence “Bill ran”¹⁰

- | | |
|---|---|
| a. [PROM] on TP | $\langle \mathbf{D^0} \rangle$ Bill $\langle T^0 \rangle$ $\langle \mathbf{D^0} \rangle$ $\langle \mathbf{Bill} \rangle$ $\langle v^0 \rangle$ ran $\langle \mathbf{ran} \rangle$ |
| b. [PROM] on DP “Bill” | $\langle \mathbf{D^0} \rangle$ Bill $\langle T^0 \rangle$ $\langle \mathbf{D^0} \rangle$ $\langle \mathbf{Bill} \rangle$ $\langle v^0 \rangle$ ran $\langle \mathbf{ran} \rangle$ |
| c. [PROM] on NP/N ⁰ “Bill” ¹¹ | $\langle D^0 \rangle$ (Bill) $\langle T^0 \rangle$ $\langle D^0 \rangle$ (Bill) $\langle v^0 \rangle$ ran $\langle \mathbf{ran} \rangle$ |
| d. [PROM] on vP | $\langle D^0 \rangle$ Bill $\langle T^0 \rangle$ $\langle \mathbf{D^0} \rangle$ $\langle \mathbf{Bill} \rangle$ $\langle v^0 \rangle$ ran $\langle \mathbf{ran} \rangle$ |
| f. [PROM] on V ⁰ | $\langle D^0 \rangle$ Bill $\langle T^0 \rangle$ $\langle D^0 \rangle$ $\langle \mathbf{Bill} \rangle$ $\langle v^0 \rangle$ (ran) $\langle \mathbf{ran} \rangle$ |

As mentioned, no candidate is generated with [PROM] on any constituent that is made up entirely of null X⁰s: T⁰, VP, and v⁰ cannot be [PROM]¹². This is ruled out due to the requirement in GEN that [PROM] constituents must have prosodic correspondents.

⁸ Simplifications of structural representations are applied to candidates in OT Workplace that capitalize on the following set of facts. The constraints are sensitive only to three properties of syntactic constituents in candidates:

- a) Whether a syntactic constituent is lexical or functional
- b) Whether a syntactic constituent is [PROM] or not
- c) Whether a syntactic constituent is pronounced or not (i.e. has a prosodic correspondent)

All other properties do not affect the location of sentential prominence. Structural relations are reduced to linear relations then, since only linear relations matter in the evaluation of the alignment constraints. The other constraints, the LCC, *Null [PROM] and Unary [PROM] do not refer to relations of either kind, structural or linear.

⁹ Chain indices do not need to be marked. Because at most only a single chain could ever be [PROM], indices were not needed in candidates. Discovery of a single null or functional [PROM] constituent was enough to warrant the single violation of the LCC or *Null [PROM] that the candidate incurs.

¹⁰ No X[’]-level categories are included. I take the position that features can belong to XP’s and X⁰’s, but not X[’].

¹¹ Here and throughout, the account does not distinguish between placing [PROM] on an NP and on the N⁰ that it dominates. No constraint distinguishes these two candidates, and so the two are collapsed into a single candidate.

¹² v⁰ contains, but does not dominate, the overt verb “ran”. The definition for syntactic edges given in appendix A requires that a given syntactic constituent dominate a terminal node in order for it to constitute an edge. This means no candidate with [PROM] v⁰ is generated since it has no prosodic correspondent. Even if this candidate were generated, it would still not be selected optimally. This candidate can be generated if the domination requirement were replaced by a containment relation instead. This would allow adjuncts to be included in the edge-calculation. The candidate with [PROM] v⁰ will now have the

The constraints Unary [PROM] and the LCC are undominated in the ranking for English. In the following tableaux, I will often omit candidates that violate these two constraints, in order to focus on the candidates that satisfy them, which is where the crucial competition is usually seen. For example in (18), candidates (a), (b), and (d) all violate Unary [PROM] since they all have [PROM] constituents that contain more than one X^0 . As a result, I only include the remaining two candidates in (19) below, where [PROM] is on the unary constituents, V^0 and NP/N^0 . See sections 2.6 and 2.7, for the crucial competitions involving Unary [PROM] and the LCC.

Tableau (19) shows how the ranking in (8) above accounts for intransitives.

(19) $\langle D^0 \rangle$ Bill $\langle T^0 \rangle$ $\langle D^0 \rangle$ $\langle \text{Bill} \rangle$ $\langle v^0 \rangle$ ran $\langle \text{ran} \rangle$

Winner: V^0 “ran” ¹³	LCC	Unary [PROM]	*Null [PROM]	ALIGN (MC, R, [PROM], R)	ALIGN (MC, L, [PROM], L)
a. N^0 “Bill”				W	L

Some discussion on how the feature [PROM] is associated with moved constituents is useful here in order to understand how constraint violations are assigned in (19) and elsewhere. I assume the copy theory of movement (Nunes, 1995) so that movement involves syntactic chains that occupy multiple positions in the syntactic structure. I assume that members of syntactic chains have identical syntactic features, and therefore, either all members or no members of a given chain are [PROM]. It is not possible, then, to generate a candidate where one member of a chain is [PROM] and another member of that chain is not.

With respect to the phonetic spell-out of prominence, there is a convention determining where the phonological features are spelled out in the phonology (on the higher copy since it c-commands the lower copy). This mechanism determines which member of a chain is pronounced and which is not. I assume the same mechanism is responsible for the phonological spell-out of all features to be interpreted in the phonological component, including the [PROM] feature: The higher copy of a [PROM] chain is both pronounced and prominent; the lower copy is not pronounced (and therefore, not prominent).

The candidates in (19) above are ones where the chains, V^0 and N^0 are [PROM] then. Both of these chains include a null copy, meaning that a single violation of *Null

overt verb “ran” at its right edge. However, it will still be suboptimal: Unary [PROM] is undominated in English and will be violated by this [PROM] v^0 candidate because it now contains two terminal elements: the null v^0 and the overt copy of V^0 , “ran”. On the other hand, the candidate with [PROM] V^0 is unary. It will not violate Unary [PROM] at all and will therefore be optimal.

¹³ For ease of exposition, individual candidates are identified in tableaux by denoting the word or words corresponding to the constituent that is [PROM] for that candidate.

[PROM] is incurred by both candidates. The constraint *Null [PROM] is not decisive then. Importantly, it is crucial to assume that there is both spec-vP-to-spec-TP movement of the subject and V-to-v movement of the verb in (16). If one of these movements did not occur, then *Null [PROM] would prefer the candidate with prominence on the in-situ constituent. Since *Null [PROM] dominates both alignment constraints, a preference is given to in-situ [PROM] constituents over right-aligned [PROM] constituents, generally. Therefore, the only time the preference for right-alignment is seen is in cases where the competition is between candidates that both have the [PROM] feature on in-situ constituents¹⁴ or between candidates that both have [PROM] chains involving null copies, as is the case in (19).

Turning now to the alignment constraints, violations are incurred only by constituents that intervene between *all* members of a [PROM] chain and an edge. This reduces to assessing only the member of a chain that is closest to the relevant clause edge for alignment violations. For example, in (19) above, the winning candidate where the V⁰ chain, “ran”, is [PROM] does not violate ALIGN (MC, R, [PROM], R), even though one of the members (the overt one) is separated from the right edge of the MC by one X⁰. The lower member of the V⁰ chain is perfectly aligned with the right edge of the MC, and so this means that the entire chain is perfectly aligned with the right edge of the MC.

In the losing candidate (19a), the subject N⁰ “Bill” is [PROM]. This violates ALIGN (MC, R, [PROM], R) three times, since there are three X⁰s (the null v⁰, and the two members of the V⁰ chain, “ran”) intervening between the rightmost (null) member of the N⁰ chain and the right clause edge. The winning candidate does not violate ALIGN (MC, R, [PROM], R) at all, since the V⁰ chain, “ran” is perfectly right aligned with the clause. On the other hand, ALIGN (MC, L, [PROM], L) is violated only once by candidate (19a), due to the null D⁰ head intervening between the leftmost (overt) member of the N⁰ chain, “Bill”, and the left clause edge. The winning candidate incurs six violations of ALIGN (MC, L, [PROM], L), one for each X⁰ intervening between the leftmost member of the V⁰ chain, “ran”, and the left clause edge. By ranking ALIGN (MC, R, [PROM], R) above ALIGN (MC, L, [PROM], L), the winner is selected optimally.

The choice of referring to the main clause in ALIGN (MC, R, [PROM], R) and ALIGN (MC, L, [PROM], L), rather than some other syntactic constituent requires some explanation. For the purposes of this paper, I will assume that the main clause is the node in syntactic structure that is not dominated by any other constituent.¹⁵ Other clausal XP’s such as the ForceP or CP could be candidates for alignment as well. I refer to the MC, rather than one of these because this account seeks to explain the *unique* main prominence in a clause. The fact that there can be more than a single CP or ForceP in a root clause allows for the possibility of having more than one prominence. For example, if instead we used a constraint ALIGN (CP, R, [PROM], R), the following sentence (from Kahnemuyipour (2009): 120, example 86) could potentially have two [PROM] features:

¹⁴ This is actually the case for examples (10) to (15), where in-situ objects or in-situ adjuncts are clause-final.

¹⁵ This strategy was suggested to me by Jane Grimshaw (p.c.).

(20) [_{CP}[_{CP} That the Leafs beat the Flyers] initiated an uproar]

Since there are two CP's, with distinct right edges, we might expect prominence to occur twice, once at the right edge of the embedded CP (on "Flyers") and once on the right edge of the matrix CP (on "uproar"). While Kahnemuyipour notes that there is a secondary stress on "Flyers" (and "Leafs" in fact), the main stress is on "uproar". Since the account here attempts only to explain the position of a *unique* sentential prominence, the presence of secondary stress is not important. It could be true that the CP edges do in fact play a large role in secondary stress determination, but this is not what this account seeks to explain.

In conclusion, the ranking $\text{ALIGN}(\text{MC}, \text{R}, [\text{PROM}], \text{R}) \gg \text{ALIGN}(\text{MC}, \text{L}, [\text{PROM}], \text{L})$ is responsible for the rightmost preference for sentential prominence in English sentences such as those in (9) to (15) above. Transitives and ditransitives, both with and without an adjunct phrase at the right edge all exhibit rightmost prominence due to this ranking. Furthermore, $\text{ALIGN}(\text{MC}, \text{R}, [\text{PROM}], \text{R})$ allows alignment to be satisfied by null copies in chains, since it is evaluated by counting syntactic constituents, not prosodic ones. This fact will become crucial in accounting for unaccusatives and passives in the next section.

2.2 Unaccusatives & Passives

The OT account predicts that in cases where a null copy in a chain is the rightmost syntactic constituent in a clause, that chain will be [PROM]. This allows for certain cases without clause-final sentential prominence. Included among these cases are sentences with unaccusative verbs and passives. The ranking established in the previous section can account for these cases. Recall from the previous section, that null copies can satisfy $\text{ALIGN}(\text{MC}, \text{R}, [\text{PROM}], \text{R})$ for the chain to which they belong. This means that a [PROM] chain whose lower copy is perfectly right aligned with the main clause is selected optimally over a candidate where the surface-final constituent is [PROM].¹⁶ Notably, the (b) examples, where the surface-final verb is prominent are infelicitous, suggesting that the presence of clause-final null copies is crucial in assignment of sentential prominence, as predicted.

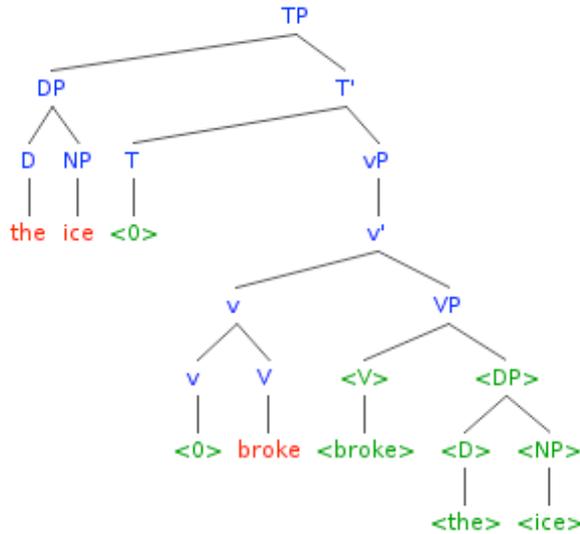
- (21) a. The ICE broke <broke> <the ICE>
b. # The ice BROKE <BROKE> <the ice>
- (22) a. The ice in the FRIDGE broke <broke> <the ice in the FRIDGE>
b. # The ice in the fridge BROKE <BROKE> <the ice in the fridge>
c. # The ICE in the fridge broke <broke> <the ICE in the fridge>
- (23) a. The BOY was chased <chased> <the BOY>
b. # The boy was CHASED <CHASED> <the boy>

¹⁶ Only the final null copy and the null copy of the verb are shown here and throughout in examples, since these are the most relevant movements in the discussion; however, the subject also moves. I assume spec-vP to spec-TP movement for subjects in transitive and intransitive sentences generally, but I do not show the lower copies in the examples.

- (24) a. The boy with the HAT was chased <chased> <the boy with the HAT>
 b. # The boy with the hat was CHASED <CHASED> <the boy with the hat>
 c. # The BOY with the hat was chased <chased> <the BOY with the hat>

The assumed structure for the unaccusative in (21) is shown below in (25).

- (25) Unaccusative Sentences (assuming V-to-v movement)



There are three candidates that could be optimal, given the structure in (25), one for each overt syntactic X^0 .¹⁷ The candidate with [PROM] on the N^0 chain, “ice”, is selected optimally as shown in tableau (26) below.

- (26) “The ice < T^0 > < v^0 > broke <broke> <the> <ice>”

Winner: N^0 “ice”	LCC	*Null [PROM]	ALIGN (MC, R, [PROM], R)	ALIGN (MC, L, [PROM], L)
a. D^0 “the”	W		W	L
b. V^0 “broke”			W	W

Candidate (26a) is ruled out due to a fatal violation of the LCC. A functional X^0 , “the” is [PROM] in (26a), whereas both the winner and candidate (26b) avoid this violation since these candidates have a [PROM] lexical X^0 . Interestingly, candidate (26b), where the verb is prominent, is harmonically bounded: Both the winner and candidate (26b) have a single violation of *Null [PROM], since both candidates have a [PROM] chain with a null copy. Both alignment constraints favour the winner here since the null copy of “ice” is perfectly right aligned with the MC, and the overt copy of “ice” is better left aligned

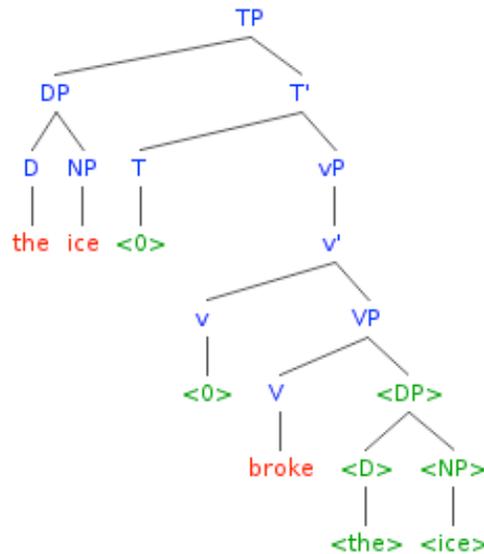
¹⁷ Recall, that candidates that violate Unary [PROM] are excluded. I include one LCC-violating candidate here but will not include any others until section 2.7, when the crucial candidate competition for ranking the LCC is given.

with the MC as well. The winner incurs one violation of ALIGN (MC, L, [PROM], L) due to the presence of “the” at the left edge. Candidate (26b) incurs four violations of ALIGN (MC, L, [PROM], L) due to the presence of “the”, “ice”, the null T^0 , and the null v^0 separating the verb “broke” from the left edge of the MC.

The OT account predicts a difference with respect to sentential prominence then between unaccusative and unergative verbs: No language can have sentential prominence on an unaccusative verb¹⁸, whereas it is possible to have sentential prominence on an unergative verb. This is the case as long as there is V-to-v movement, such that the verbal head fares poorer on both left- and right-alignment than the subject DP-chain. A typological study could confirm the validity of this prediction.

The assumption that there is V-to-v movement is crucial here. Consider a structure shown in (27), similar to (25) but without V-to-v movement.

(27) Alternative Structure for Unaccusative Sentences (assuming in-situ V^0)



Again, three candidates are generated, one for each potential location of [PROM]. This time, however, the current ranking incorrectly predicts that the V^0 “broke” should be [PROM]. This is illustrated in tableau (28) below.

¹⁸ However, it is not the case that the OT account predicts that the subject is always prominent in unaccusatives. To give one example, insertion of an in-situ adverb would mean that a candidate where this adverb head is [PROM] would be selected optimally.

(28) “The ice <T⁰> <v⁰> broke <the> <ice>”

	LCC	*Null [PROM]	ALIGN (MC, R, [PROM], R)	ALIGN (MC, L, [PROM], L)
a. D ⁰ “the”	*!	*	*	
☹ b. N ⁰ “ice”		*!		*
☛ c. V ⁰ “broke”			**	**

Candidate (28b) is the desired winner, with prominence on the N⁰ “ice”; however since the V⁰ “broke” remains in-situ, candidate (28c), where “broke” is [PROM] avoids a violation of *Null [PROM]. The single violation of *Null [PROM] on candidate (28b) is thus fatal. Therefore, it is crucial to assume V-to-v movement in this account in order to avoid this situation.¹⁹ Since *Null [PROM] outranks ALIGN (MC, R, [PROM], R), candidates with prominence on in-situ syntactic constituents will always be selected optimally over candidates with prominence on remerged syntactic constituents, even if there is a perfectly right-aligned null copy.

2.3 Wh-Movement

Another case of sentential stress with clause-final movement can be seen with wh-movement that involves pied-piped lexical constituents. The analysis given above for unaccusatives and passives also applies to cases of wh-movement involving lexical NP’s whose lower copies are clause-final. This is true despite the fact that wh-movement, unlike movement in unaccusative and passive structures, target A’ positions. In addition, the data shown above were focus-neutral, whereas the inclusion of wh-phrases automatically attracts focus onto the wh-phrase. These two differences might suggest a separate treatment of prominence within clauses with wh-words. However, despite these differences, the position of prominence with clause-final wh-movement is predicted by the OT account.

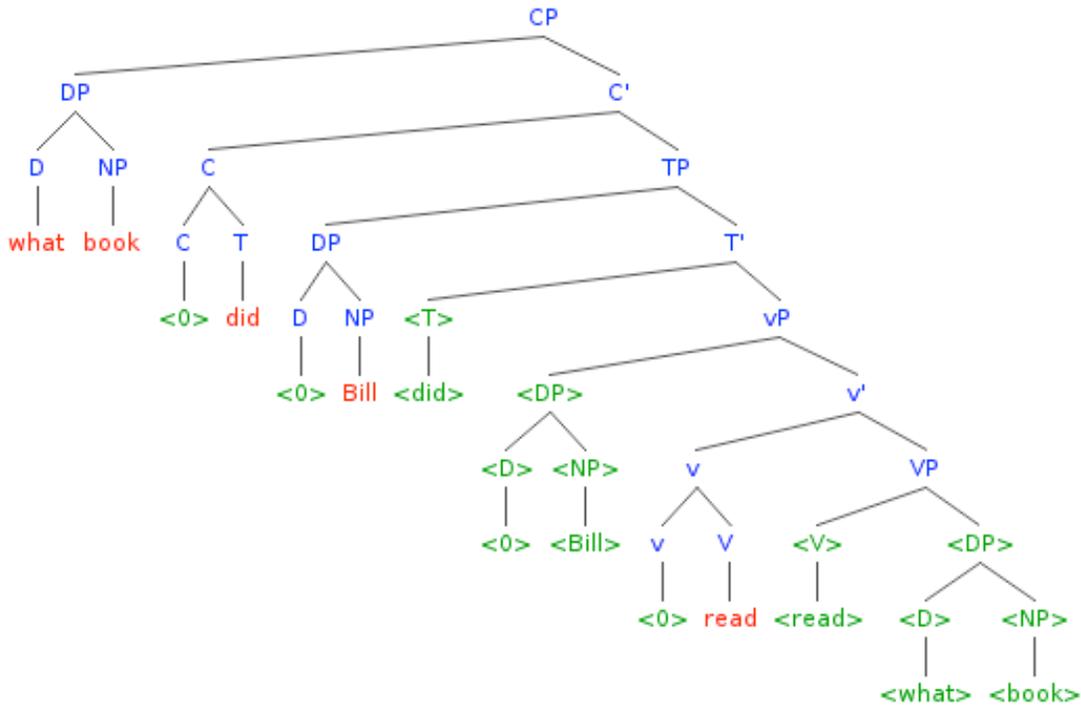
Turning now to the facts, if wh-movement pied pipes a lexical XP that is clause-final, this lexical XP will receive main prominence.

- (29) a. What BOOK did Bill read <read> <what BOOK>?
 b. # What book did Bill READ <READ> <what book>?

This pattern of a final null copy is analogous to the one seen above for unaccusatives and passives in (21) to (24). The structure for (29) is given below.

¹⁹ In fact, an analogous argument exists for the assumption that subjects move from spec-vP to spec-TP in unergatives: If they did not, then the subject would be predicted to be [PROM] in an unergative.

(30)



There are three candidates corresponding to each of the three lexical X^0 's, “book”, “Bill” and “read”. Assuming “what” is a functional D^0 head, a candidate where “what” is [PROM] will violate the LCC and be suboptimal. The same is true if “did” were [PROM]. These LCC-violating candidates are excluded from the tableau below.

(31) “What book $\langle C^0 \rangle$ did $\langle D^0 \rangle$ Bill $\langle did \rangle$ $\langle D^0 \rangle$ $\langle Bill \rangle$ $\langle v^0 \rangle$ read $\langle read \rangle$ $\langle what \rangle$ $\langle book \rangle$?”

Winner: N^0 “book”	LCC	*Null [PROM]	ALIGN (MC, R, [PROM], R)	ALIGN (MC, L, [PROM], L)
a. N^0 “Bill”			W	W
b. V^0 “read”			W	W

All three candidates violate *Null [PROM] once because in each case a [PROM] null constituent exists (all three lexical X^0 's are parts of chains with null lower copies). The winner is thus the candidate that best satisfies the right-alignment constraint. Since the null copy of “book” is rightmost in the MC, the [PROM] feature is optimally located on the N^0 chain, “book”.

In cases of wh-movement without pied-piping, like (32) below, the prominence is instead on the rightmost lexical X^0 , the V^0 “read”.

- (32) a. What did Bill READ $\langle READ \rangle$ $\langle what \rangle$?
 b. # WHAT did Bill read $\langle read \rangle$ $\langle WHAT \rangle$?

Tableau (33) shows how the ranking derives this. Assuming wh-words are functional D⁰'s, then the LCC is violated in (33b), but not in (33a) or the winning candidate, thus explaining why the D⁰ “what” cannot occur with [PROM]. Therefore the only candidates that satisfy the LCC for (33) are ones with [PROM] on the N⁰, “Bill” or the V⁰, “read”.

(33) “What did <C⁰> <D⁰> Bill <did> <D⁰> <Bill> <v⁰> read <read> <what>?”

Winner: “read”	LCC	*Null [PROM]	ALIGN (MC, R, [PROM], R)	ALIGN (MC, L, [PROM], L)
a. “Bill”			W	L
b. “what”	W		L	L

Just as in (31) above, all of the lexical constituents in (33) are remerged (“Bill” via movement from spec-vP to spec-TP and “read” via V-to-v movement). Therefore the [PROM] chains in both candidates contain one null copy, incurring a single violation of *Null [PROM] each. This leaves alignment to choose between the two remaining candidates. The lower copy of the V⁰, “read”, is closer to the right clause edge than the N⁰, “Bill”. Therefore, the candidate with “read” as [PROM] fares better on ALIGN (MC, R, [PROM], R).

The same facts hold for wh-movement in unaccusatives ((34) and (35)), in passives ((36) and (37)), in ditransitives ((38) and (39)), and with restrictive relative clauses ((40), (41) and (42)). In all cases, the rightmost lexical X⁰ is the host for the [PROM] feature.

- (34) a. What BROKE <what>?
b. # WHAT broke <WHAT>?
- (35) a. What ICE broke <what ICE>?
b. # what ice BROKE <what ice>?
- (36) a. What was KICKED <what>?
b. # WHAT was kicked <WHAT>?
- (37) a. What BALL was kicked <what BALL>?
b. # What ball was KICKED <what ball>?
- (38) a. What did Bill GIVE him <what>?
b. # WHAT did Bill give him <what>?
- (39) a. What BOOK did Bill give him <what BOOK>?
b. # What book did Bill GIVE him <what book>?
- (40) a. What did you like that Bill READ <what>?
b. # WHAT did you like that Bill read <WHAT>?
- (41) a. What BOOK did you like <what BOOK> that Bill read <what BOOK>?
b. # What book did you like <what book> that Bill READ <what book>?

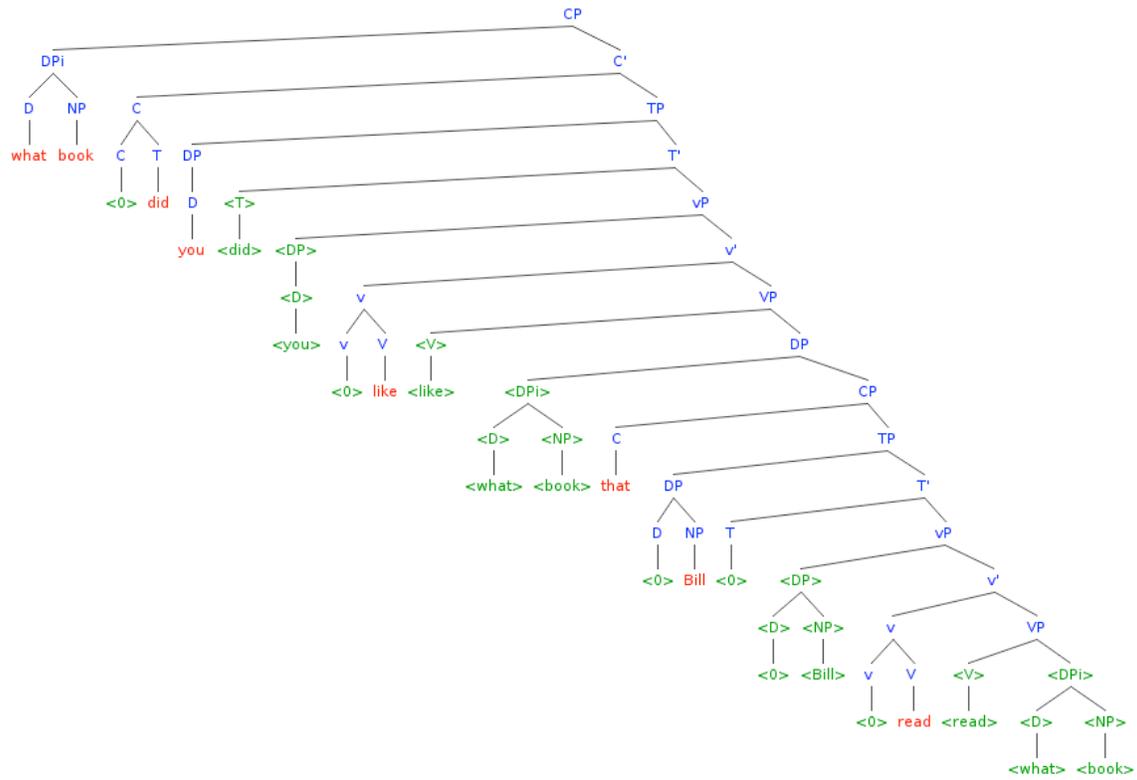
- (42) a. What BOOK that Bill read did you like <what BOOK that Bill read <what BOOK>>
b. # What book that Bill read did you LIKE <what book that Bill read <what book>>

Wh-movement appears to fall under the same analysis for other cases of movement from clause-final position then: The rightmost lexical syntactic X^0 in the MC is relatively more prominent than all other X^0 's. This is true even if that element is a null copy, in which case the prominence surfaces phonologically on the overt copy.

A side-point here concerns successive cyclic wh-movement and the nature of the LCC and *Null [PROM]. These two constraints assess chains, rather than members of chains. Therefore, no matter how many copies of a functional [PROM] constituent or of a null [PROM] constituent exist, only one violation is incurred per chain. Since there can only be one syntactic constituent that is [PROM] per MC, this means that the LCC and *Null [PROM] are violated once or not at all by a candidate.

Violations of the LCC and *Null [PROM] could alternatively be assessed gradually over *members* of chains rather than entire chains. *Null [PROM] would then prefer [PROM] chains with fewer intermediate positions, a fact that has consequences for successive cyclic wh-movement. A gradient version of *Null [PROM] would prefer prominence on chains with as few intermediate positions as possible. This would run afoul in cases of successive cyclic wh-movement in restrictive relative clauses as in (43) below.

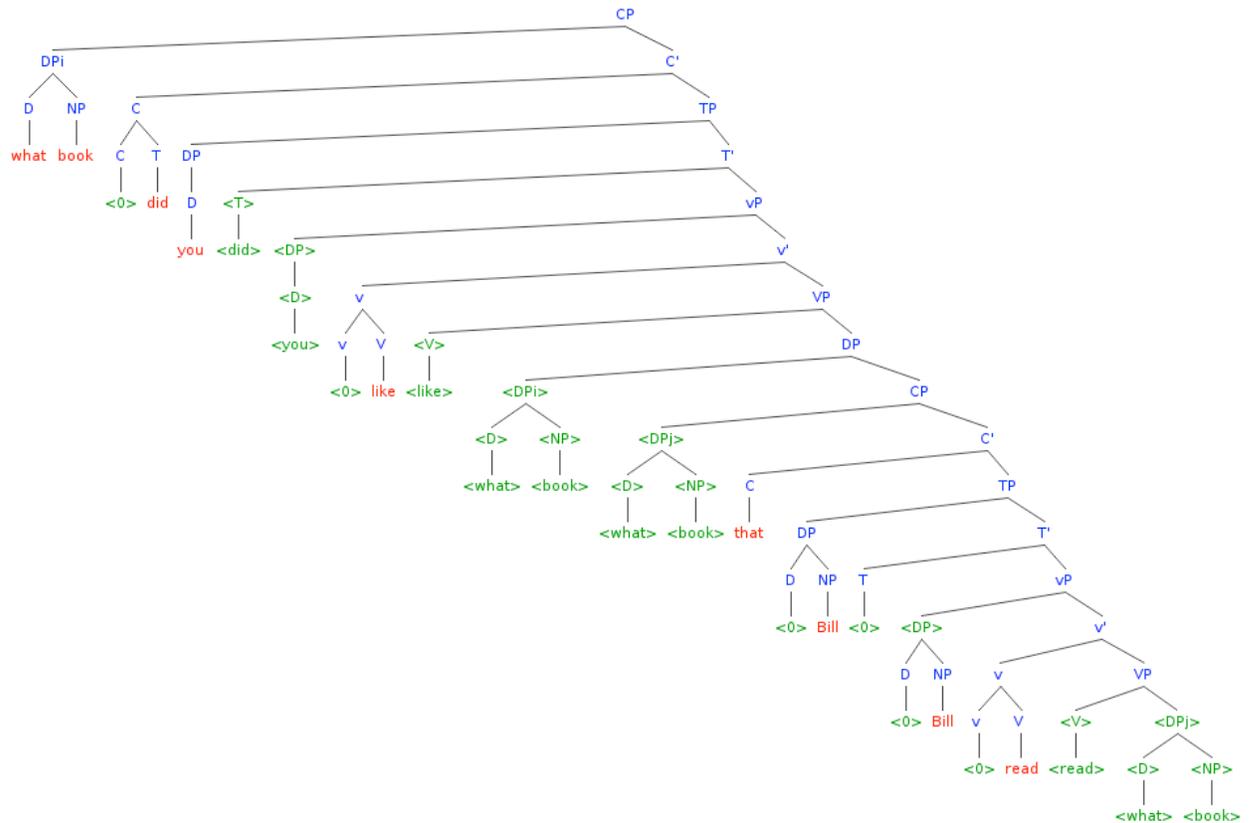
(43) “What BOOK did you like <what BOOK> that Bill read <read> <what BOOK>?”



Assume “what book” stops in the intermediate spec-CP position prior to raising to its overt position. Since “read” only has one null copy and “book” has two, a gradient version of *Null [PROM] would prefer the prominence to be on “read” since it has one fewer null copy. However, it appears that no such preference exists in English, and so I adopt the categorical version of *Null [PROM], with one violation per offending chain, no matter how many elements it contains. This decision does not matter as much for the LCC as there is no similar argument to be made among functional elements, since they are never prominent in English. Nevertheless, I adopt the same convention for the LCC for the sake of symmetry: Only one violation per functional chain is incurred.

The structure in (43) above is not the only structure that might be assumed for movement in restrictive relative clauses however. Wh-movement usually targets A' positions, and so one might posit that the wh-phrase “what book” moves to spec-CP of the relative clause, rather than the adjoined DP. In this case, a separate instance of “what book” would merge adjoined to the relative clause, one that is co-referent but part of a distinct chain. This structure is illustrated below.

(44)



If this structure is correct, then there are two separate chains for the DP “what book”. The lower chain would have no prosodic correspondent. As such, no candidate would be generated where “what book” is [PROM]. Therefore, the next rightmost X^0 , the V^0 , “read”, is predicted to be [PROM], contrary to fact. Therefore, the OT account only makes the correct prediction if there is a single wh-chain, as in the structure in (43) above. It makes the wrong prediction if two separate chains are posited, as in (44) above.

One note concerns a potential alternative analysis of prominence with wh-movement: Wh-phrases necessarily attract focus and so a constraint Stress-to-Focus would favour prominence on wh-phrases, regardless of their position.²⁰ As long as the LCC outranks Stress-to-Focus, the same facts will hold: Any wh-phrase that pied-pipes a lexical NP will be [PROM]. This alternative can explain the data above equally as well as the alignment-based account.

However, there are two cases that Stress-to-Focus cannot account for: First, when a wh-phrase is the subject of an unergative, the Stress-to-Focus account incorrectly predicts that the wh-phrase should be prominent, whereas the OT account correctly predicts that the verb should be prominent. This is illustrated in (45) below:

²⁰ This alternative was pointed out to me by Jane Grimshaw (p.c.).

- (45) a. What boy <what boy> RAN <RAN>?
 b. # what BOY <what BOY> ran <ran>?

Since the lower copy of the V⁰ “ran” is rightmost in the MC, ALIGN (MC, R, [PROM], R) prefers “ran” to be [PROM]. This follows the same logic as the argument made for unergatives in tableau (19) above.

Second, when a wh-phrase has a clause-final null copy in a ditransitive, the Stress-to-Focus account incorrectly predicts that the wh-phrase should be prominent. On the other hand, the OT account predicts that the surface-final direct object is prominent. This is illustrated in (46) below (this is example (55) in the following section).

- (46) a. What book did Bill give JOHN <give> <what book>?
 b. # What BOOK did Bill give John <give> <what BOOK>?

The OT account predicts that (46a) is optimal because “John” is in-situ and *Null [PROM] favours candidates with [PROM] on in-situ constituents. Since the NP “book” is part of a chain, it violates *Null [PROM]. A more detailed explanation for how (46a) is selected optimally is given in the following section, where ditransitives are considered.

An exception that the current account, and also the Stress-to-Focus account, in fact, fails to predict, concerns cases of long-distance wh-movement, as pointed out by Grimshaw (p.c.):

- (47) a. What book did Frank tell Mary that Henry LIKED <LIKED> <what book>?
 b. # What BOOK did Frank tell Mary that Henry liked <liked> <what BOOK>?

The OT account would predict that “book” should be [PROM] here. Since all lexical X⁰s are members of chains, the rightmost X⁰ is predicted to be [PROM]. This would predict that the infelicitous example in (47b) should be optimal.

One potential explanation for the failure of the wh-chain to receive prominence, might be that the prominence is too far from the right edge of the clause. This could be enforced either in the syntax or, alternatively, in the prosody. In the syntax, a reference might exist to a maximum number of syntactic boundaries that a [PROM] chain is allowed to span. That syntactic boundary might be the clause edge, or the phase-boundary. A prosodic account might require the main prominence to be included in a right-aligned prosodic constituent larger than the word (such as the phonological phrase).

A second example pointed out by Grimshaw (p.c) might be consistent with a prosodic explanation²¹:

²¹ A third potential class of exceptions include “how many X” phrases such as the following:

- (a) ? How many TOYS should he buy <buy> <how many TOYS>?

- (48) a. What did the DOCTOR say <say> <what>?
 b. # What did the doctor SAY <SAY> <what>?

Ignoring prosody, the OT account predicts that the sentential prominence should be on “say” here, contrary to fact, since the lower copy of “say” is the rightmost lexical constituent and there are no in-situ constituents in this sentence. If the verb is bisyllabic or if the subject is a monosyllabic proper name, however, the sentential prominence is on the verb, as predicted by the OT account:

- (49) a. What did the doctor PROMISE <PROMISE> <what>?
 b. # What did the DOCTOR promise <promise> <what>?
 (50) a. What did Bill SAY <SAY> <what>?
 b. # What did BILL say <say> <what>?
 (51) a. What did Bill PROMISE <PROMISE> <what>?
 b. # What did BILL promise <promise> <what>?

Consider also the following example:

- (52) a. What did the doctor READ <READ> <what>?
 b. # What did the DOCTOR read <read> <what>?

If the verb “read” is used instead of the verb “say”, the prominence is again on the verb, as predicted. One possibility is that “doctor say” forms a single prosodic constituent more easily than “doctor read”. If this is due to a prosodic effect, then the only possible reason for shifting the prominence is due to the fact that “read” has a coda and “say” does not.

We can see this with other monosyllabic verbs that lack a coda as well:

- (53) a. What did the DOCTOR see <see> <what>?
 b. # What did the doctor SEE <SEE> <what>?
 (54) a. What did the doctor READ <READ> <what>?
 b. # What did the DOCTOR read <read> <what>?

The verbs used above both take CP complements, and are semantically similar. Therefore, it appears that it is the prosodic character of the verb and subject (or of the unit that they form) that is relevant. Clearly, the OT account does not encapsulate the whole story. Some further evidence for prosodic constraints on sentential prominence location is included in section 2.8 below.

-
- (b) ? How many toys should he BUY <BUY> <how many toys>?

The author prefers (a) but another English speaker judges (b) to be more natural. The OT account predicts (a) and not (b) since the lower copy of “toys” is clause-final and there are no in-situ lexical X⁰'s in this sentence. I leave this example, for now, noting it as a potential problem for this account.

2.4 Movement in Ditransitives

Not all cases of movement from clause-final position conform to the generalization that the rightmost syntactic chain is prominent, however. This generalization does not hold in cases where a lexical XP is moved from clause-final position, but there is an in-situ syntactic constituent. This situation is seen when a direct object moves out of clause-final position in a restrictive relative clause: In this case, the surface-final, in-situ indirect object XP is prominent. The OT account predicts this because the constraint *Null [PROM] favours [PROM] in-situ constituents to [PROM] chains. By ranking *Null [PROM] above ALIGN (MC, R, [PROM], R), a preference to in-situ constituents is established, even if there is a better-aligned chain present. This was shown to be true in (27) above, where if V-to-v movement was not assumed, then the account predicted the verb should be [PROM]. This prediction of the OT account is correct in cases with movement of the head of a restrictive relative clause containing a ditransitive, as long as the indirect object remains in-situ:

- (55) a. I like the book that Bill gave JOHN <gave> <the book>
b. # I like the BOOK that Bill gave John <gave> <the BOOK>

The structure assumed for (55) is given below.

There is, however, still a preference for rightmost null copies to be prominent in ditransitive structures, but this preference only emerges when the preference for an in-situ constituent for the [PROM] feature cannot be met. If the direct object is pronominal, as in (58) below, the moved XP *is* prominent, just like (32) above. Rather than moving to the next rightmost *overt* lexical X^0 , “gave”, the prominence defaults to the rightmost X^0 – whether covert or overt – in this case, “book”.

- (58) a. I like the BOOK that Bill gave him <gave> <the BOOK>
 b. # I like the book that Bill GAVE him <GAVE> <the book>

Since the LCC outranks *Null[PROM], the default rightmost prominence is seen instead, where the lower copy of “book” attracts prominence. However, the case in (55) showed that in-situ constituents are preferentially prominent, even when ALIGN (MC, R, [PROM], R) does not prefer them. This is captured in the ranking of *Null [PROM] above ALIGN (MC, R, [PROM], R).

Similarly in cases of wh-movement of an indirect object, the same fact holds: The direct object is prominent, not the wh-raised indirect object:

- (59) a. What book did Bill give JOHN <give> <what book>?
 b. # What BOOK did Bill give John <give> <what BOOK>?

cf. (60) below, with a pronominal direct object:

- (60) a. What BOOK did Bill give him <give> <what BOOK>?
 b. # What book did Bill GIVE him <GIVE> <what book>?

The same effect can be observed in (61) and (62) below when wh-moving a clause-final adjunct past an argument, suggesting that it does not matter whether or not the moved constituent is an argument. These examples also illustrate that it is not only in-situ arguments in ditransitives, but also those in transitives that attract prominence.

- (61) a. In what park did he read <read> the BOOK <in what park>?
 b. # In what PARK did he read <read> the book <in what PARK>?
 (62) a. In what PARK did he read <read> it <in what PARK>?
 b. # In what park did he READ <READ> it <in what park>?

Turning to wh-movement with unaccusatives, the facts are less clear. In this case the direct object is itself part of a chain. Notably, the lower copy position in (63a) occupies the same syntactic position that the prominent direct objects do in (59a) and (61a): All are direct complements of the verb. However, it is not clear whether the main prominence in example (63) is judged on “ice” or on “fridge”. Judgements were elicited from two additional English speakers, with one preferring (63a) and the other preferring (63b).

- (63) a. ? In what fridge did the ICE melt <the ICE> <in what fridge>?
 b. ? In what FRIDGE did the ice melt <the ice> <in what FRIDGE>?

- (64) a. In what FRIDGE did it melt <it> <in what FRIDGE>?
 b. # In what fridge did it MELT <it> <in what fridge>?

In (59), (61) and (63), the OT account here would predict that prominence should be assigned to the final lexical X^0 (the N^0 's, “book”, “park”, and “fridge” respectively – the (a) examples). This follows the same line of reasoning argued for in tableau (57) above: There is only a single in-situ syntactic X^0 , and so *Null [PROM] prefers this X^0 to be prominent. While this problematic judgement in (63) is unaccounted for here, at least the account predicts one of the possible options to surface.

In summary, when a chain is clause-final and there is an in-situ constituent, the in-situ constituent is [PROM], and not the clause-final chain. This follows from the ranking *Null [PROM] >> ALIGN (MC, R, [PROM], R). The preference for in-situ prominence is more important than being perfectly right aligned with the main clause. This accounts for cases where an indirect object moves in a restrictive relative clause. The in-situ direct object is prominent even though the lower copy of the moved indirect object is clause-final.

2.5 Adverbs

The OT account also can account for the position of sentential prominence in intransitive sentences with adverbs both preceding and following the verb²². When an adverb follows an unaccusative verb, the main prominence is not on the subject, “ice”, (as it was in (21) above), but is instead on the verb, as seen in (65) below. The same holds for passives, as seen in (67). In (69) and (70), we see that the same facts hold for unergatives: The verb is always prominent when an adverb precedes it. This set of data is accounted for here by positing that V-to-v movement does not occur in just these cases below. Since the V^0 is the rightmost in situ constituent, it is prominent.

- (65) a. The ice loudly BROKE <the ice>
 b. # The ICE loudly broke <the ICE>
 c. # The ice LOUDLY broke <the ice>
 (66) a. The ice probably BROKE <the ice>
 b. # The ICE probably broke <the ICE>
 c. # The ice PROBABLY broke <the ice>
 (67) a. The bell was loudly RUNG <the bell>
 b. # The BELL was loudly rung <the BELL>
 c. # The bell was LOUDLY rung <the bell>
 (68) a. The bell was surely RUNG <the bell>
 b. # The BELL was surely rung <the BELL>
 c. # The bell was SURELY rung <the bell>

²² Kahnemuyipour (2009) claims that this is true only of manner adverbs. However, it appears that the presence of any adverb immediately preceding the verb will shift the main prominence onto the verb in these cases. Examples (66) and (68) use subject-oriented adverbs, and the effect is the same as with the manner adverbs in (65) & (67).

- (69) a. The boy <the boy> slowly RAN
 b. # The BOY <the BOY> slowly ran
 c. # The boy <the boy> SLOWLY ran
- (70) a. The boy <the boy> probably RAN
 b. # The BOY <the BOY> probably ran
 c. # The boy <the boy> PROBABLY ran

Recall that for unaccusatives and passives, when there is no adverb, the account predicted that the main prominence should be on the subjects “ice” and “bell” since their lower copies are rightmost. This would correspond to the (b) examples, which are infelicitous. Adverbs can occur in many different syntactic positions on the surface. Cinque (1999) has argued that these different orders are accounted for because other constituents can move around the adverbs, which themselves remain in-situ. If this is the case, then due to the force of *Null [PROM], the adverb, being the only in-situ X^0 , should attract prominence, contrary to the facts where the (c) examples above are infelicitous. Even if the adverbs are assumed to re-merge, contrary to Cinque (1999), there is still no explanation for why the (a) examples should be optimal and not the (b) examples for the unaccusatives and passives, since the subjects have clause-final null copies. A solution is proposed below that adopts Cinque’s analysis of adverbs, but that explains the exceptional prominence patterns by positing that the V^0 remains in-situ in the sentences in (65) to (70) above.

First, note that when the adverbs are clause-final, they are in fact prominent, as the OT analysis would predict if the adverbs remain in-situ.²³

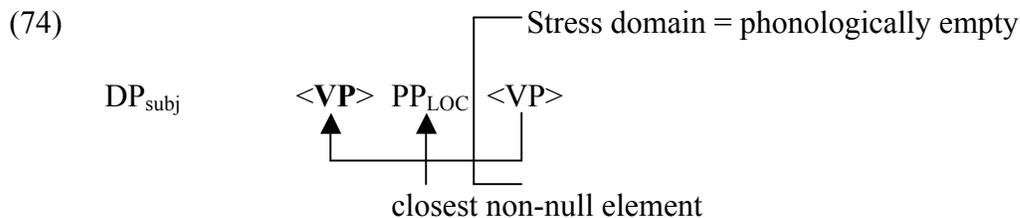
- (71) a. The ice broke LOUDLY <broke> <the ice>
 b. # The ICE broke loudly <broke> <the ICE>
 c. # The ice BROKE loudly <BROKE> <the ice>
- (72) a. The bell was rung LOUDLY <rung> <the bell>
 b. # The BELL was rung loudly <rung> <the BELL>
 c. # The bell was RUNG loudly <RUNG> <the bell>
- (73) a. The boy <the boy> ran SLOWLY <ran>
 b. # The BOY <the BOY> ran slowly <ran>
 c. # The boy <the boy> RAN slowly <RAN>

This is true of manner adverbs only. The adverbs “probably” and “surely” are not prominent when they are clause-final (i.e. “The ICE broke, probably”). Kahnemuyipour (2009) discusses these latter cases and attributes different merge positions to manner adverbs and to speaker- or subject-oriented adverbs such as “probably” and “surely”. While manner adverbs merge in a lower projection, speaker- and subject-oriented adverbs merge in a higher position. Kahnemuyipour (2009: 82, fn. 11) notes that speaker- and subject-oriented adverbs, when final, are informationally marked and are thus left out of his stress domain. In these cases, these adverbs would not be part of the same intonational

²³ The other possibility that the OT account is consistent with, is one where the adverb has moved, and the lower copy of the adverb is rightmost in the clause.

phrase. Since the goal is to account for default prominence within a single clause/intonational phrase, these informationally marked adverbs arguably do not fall under the domain of explanation here. Therefore cases such as “The ICE broke, probably” are not handled in this account.

The solution proposed here follows Kahnemuyipour’s (2009) analysis with respect to the syntactic structure of manner adverbials. In his system, manner adverbs are merged outside the stress domain and receive stress by virtue of the fact that after the verb moves over them, they are the rightmost potentially stressable constituents. Normally, within Kahnemuyipour’s system, prominence is assigned within the stress domain (this stress domain is the complement to a phase-head in his account). In cases where it is empty, such as below, the rightmost overt constituent is prominent instead. His example (21) (p. 83) exhibits how an adverb is stressed, where PP_{LOC} is the manner adverbial:



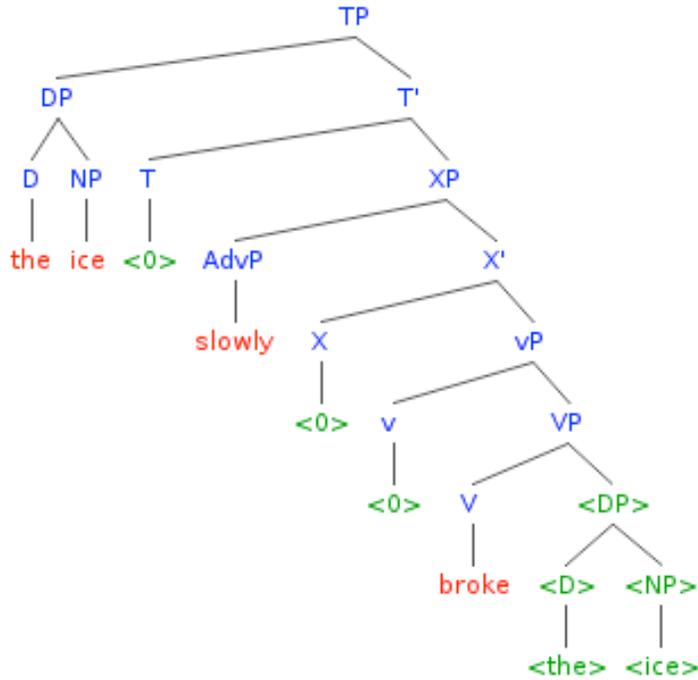
Assuming this structure, the OT account predicts the same thing: Manner adverbs should be prominent. Whereas in Kahnemuyipour’s system this was because the manner adverb was the closest element to the (phonologically empty) stress domain, here it is because it is the only in-situ lexical element in the clause.

I now turn to the original data in (65) to (70) above. If the manner adverb is the only in-situ constituent, it should be prominent regardless of its location. Again, Kahnemuyipour’s explanation of manner adverbs will account for the data in (65) to (70) in the OT account. Kahnemuyipour posits that the cases where the manner adverbs are medial correspond to cases where the verb fails to move outside of the stress domain. If we take this one step further, positing that the V^0 actually remains *in-situ* in these cases, then the solution is complete: If the verb does not raise, then the verb is prominent instead, since it is the rightmost in-situ lexical constituent. However, if the verb raises to v^0 , then the manner adverb is prominent (as the only in-situ constituent) as in (71) and (72) above.

To see how this is derived, consider the syntactic structure for (65), shown below²⁴:

²⁴ I follow Cinque (1999) in assuming that adverbs occur in spec of some functional projection, here XP. The adverb might alternatively be the head of a projection; the account does not depend on these assumptions and applies just as well in either case. All that is needed is that the adverb is merged in-situ in a position preceding the verb.

(75)



The tableau below illustrates how the candidate with the V^0 , “broke” as [PROM] is selected optimally over the other two candidates that are generated, namely with the N^0 , “ice” and the Adv^0 , “loudly” as [PROM].

(76) “The ice $\langle T^0 \rangle$ loudly $\langle X^0 \rangle$ $\langle v^0 \rangle$ broke $\langle the \rangle$ $\langle ice \rangle$ ”

Winner: “broke”	LCC	*Null [PROM]	ALIGN (MC, R, [PROM], R)	ALIGN (MC, L, [PROM], L)
a. “ice”		W	L	L
b. “loudly”			W	L

Candidate (76a), with prominence on “ice” incurs a single violation of *Null [PROM] because “ice” is a [PROM] chain. The winning candidate and candidate (76b) avoid any violations of *Null [PROM] because the [PROM] constituent remains in-situ in both cases. Candidate (76b) incurs an extra fatal violation of ALIGN (MC, R, [PROM], R) because the V^0 , “broke” is closer to the right edge of the MC than the Adv^0 , “loudly”. Therefore the prominence is on the verb, “broke”.

The cases in (71) and (72) with the medial adverb are handled the same way as previously: Since the verb raises, the only in-situ constituent, the adverb, is prominent. There is one potential problem here concerning the word order. In order to allow the verb to move across the adverb, either the adverb must be merged below vP, or the verb must move to some position higher than v^0 . Regardless of which of these explanations is adopted, the explanation is a familiar one: In-situ constituents are favoured over moved

constituents in prominence assignment. We have seen this with a single in-situ argument (as in (61) above), with an in-situ direct object of a ditransitive (as in (55) above) and now with an in-situ verb (as in (76) above). This is predicted since *Null [PROM] is ranked above ALIGN (MC, R, [PROM], R).

2.6 The Role of The LCC

Because functional X^0 's are never [PROM] in English, the LCC is undominated. This section gives the candidate competition that establishes the LCC in the cumulative constraint ranking, given in (8) above. Consider again the passive in (23) above, repeated in (77) below, but with a third candidate included, one where the prominence is on the T^0 , "was".²⁵

- (77) a. The BOY was chased <chased> <the BOY>
 b. # The boy was CHASED <CHASED> <the boy>
 c. # The boy WAS chased <chased> <the boy>

We have seen that ALIGN (MC, R, [PROM], R) prefers prominence on "boy" because the lower copy better satisfies right-alignment than if the prominence were on "chased". However, given the role of *Null [PROM] in the previous section, candidate (77c) must be taken seriously since the T^0 "was" is the rightmost in-situ constituent. The competition between (77a) and (77c) establishes that the LCC must outrank *Null [PROM] then. This is shown in the following tableau:

- (78) "The boy was < v^0 > chased <chased> <the boy>"

Winner: "boy"	LCC	*Null [PROM]	ALIGN (MC, R, [PROM], R)	ALIGN (MC, L, [PROM], L)
a. "was"	W	L	W	W

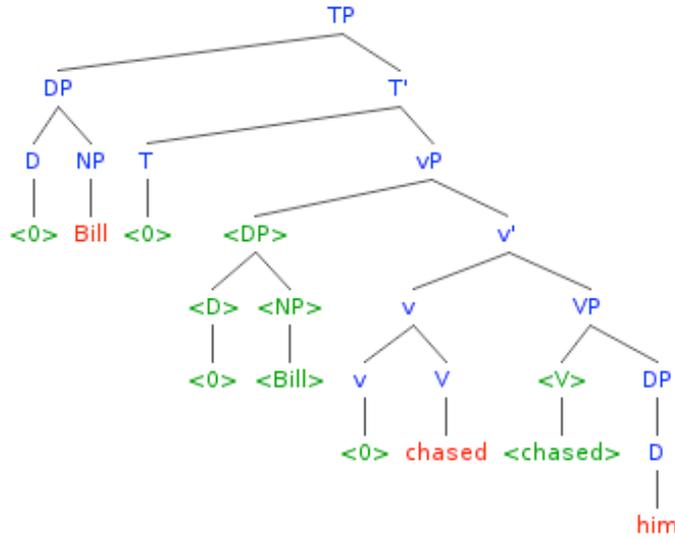
Having already established that *Null [PROM] must outrank both alignment constraints, this tableau demonstrates that the only constraint that can favour the winner over candidate (78a) is the LCC. Therefore the LCC must outrank *Null [PROM].

2.7 The Role of Unary [PROM]

Unary [PROM] incurs violations of constituents that contain more than one terminal constituent. One violation is incurred per extra terminal constituent. This constraint will tend to favour [PROM] X^0 's over [PROM] XP's then. Unary [PROM] must outrank the right-alignment constraint, ALIGN (MC, R, [PROM], R), in order to derive the correct location of sentential prominence. To see this, consider the following example:

²⁵ It is unimportant exactly what the syntactic category of "was" is, just that it remains in-situ.

(79) Bill CHASED him



In this example, the sentential prominence is on the verb “chased”. The two candidates at issue here are one where the VP is [PROM] and another where V^0 is [PROM]. Since V-to-v movement is assumed, the VP only contains the lower copy of V^0 at its left syntactic edge and the D^0 , “him” at its right syntactic edge. A candidate where VP is [PROM] must have that VP correspond to some φ in order to even be generated in the first place. Since “him” is the only prosodically parsed material, this is the only word available for a φ to align its morphological edges with²⁶. Since candidates only are generated that have a syntactic constituent in correspondence with a prosodic constituent, this would require that the VP also have both morphological edges on the morpheme “him”. This of course means that the sentential prominence in this candidate could only be spelled out on “him”, an incorrect result.

We turn now to the candidate where V^0 is [PROM] instead. V^0 is a chain with a lower null copy, and since the lower copy lacks any prosodic structure, no correspondence relation can exist built around this copy. The higher copy can host a correspondence relation around the overt verb “chased”, however, and so this is the site where the prosody places the sentential prominence. This is of course consistent with the surface facts, and so the account should optimally select this candidate. The following tableau illustrates these two candidates along with the ranking that must hold in order to correctly predict the location of sentential prominence in (79) above.

²⁶ It is possible that this could be ruled out independently via constraints in prosody, however I wish to illustrate how this could be done in the OT account via Unary [PROM]. If a prosodic explanation is used here instead, then Unary [PROM] is inactive.

(80)

winner: V ⁰ “chased”	LCC	*Null [PROM]	Unary [PROM]	ALIGN (MC, R, [PROM], R)	ALIGN (MC, L, [PROM], L)
a. VP “him”			W	L	W

The constraint *Null [PROM] is equally violated by both candidates. The winner consists of a [PROM] chain, incurring a single violation. The loser consists of a [PROM] VP that dominates the null copy of the V⁰, thus incurring a single violation of *Null [PROM]. The losing candidate violates Unary [PROM] once since the [PROM] VP contains two X⁰'s. However, the winning candidate only contains a single X⁰, and thus avoids violating Unary [PROM]. ALIGN (MC, R, [PROM], R) is violated once for the winner, since the D⁰ “him” separates the right edge of the V⁰ [PROM] chain from the right edge of the MC. The loser does not violate ALIGN (MC, R, [PROM], R) however, since it is perfectly right-aligned with the MC. Therefore, in order to optimally select the candidate with the main prominence spelled out on the verb, Unary [PROM] must outrank ALIGN (MC, R, [PROM], R).²⁷

Since prominence is phonologically manifested on a single syllable, this constraint can be intuited as the force that prefers a [PROM] syntactic constituent to be as small as possible. Learners would arguably benefit from a strategy that assumes a smaller domain for the [PROM] feature. This is because when presented with surface forms where a single syllable is prominent, the learner must then figure out which syntactic constituent is [PROM] from this. It is a much easier task to assign prominence to an X⁰, which corresponds to a prominent prosodic word directly, than to choose from among various different XP's, each of which could indirectly correspond to the prominent prosodic word. I argue that Unary [PROM] encapsulates this advantage for learners by making [PROM] constituents more marked, the larger they are.

2.8 Exceptions: Prosodic Effects

While the above analysis demonstrated that sentential prominence is not surface-final in cases where a lower copy of a chain is clause-final, there are cases where this is not the case because of prosodic effects on prominence. These cases all shift prominence to final prosodic words that contain a large number of syllables. This effect is only observed clause-finally: Prominence is never shifted leftward (onto subjects for example) for prosodic reasons. The data in the previous sections attempted to control for prosodic effects by limiting verbs and nouns to one syllable. In this section, these prosodic effects are explored. Appendix C shows these prosodic effects in more detail. Effects of syllable-size were discovered during a search in Levin (1993).

²⁷ Interestingly, even though the candidate with the [PROM] VP would surface with a prominent functional word, “him”, it does not violate the LCC.

In unaccusative verbs²⁸ with four or more syllables, the verb and not the subject is prominent. Recall

- (81) a. The ice EMULSIFIED <the ice>
b. # The ICE emulsified <the ICE>
- (82) a. The ice VOLATILIZED <the ice>
b. # The ICE volatilized <the ICE>

Recall previously that unaccusatives usually have the subject as the most prominent element, as seen in (21) above, repeated in (83) below:

- (83) a. The ICE broke
b. # The ice BROKE

A four-syllable nonce verb “kittikuttten” is primed for unaccusativity by setting up a causative/inchoative alternation:

- (84) a. The boy kittikutttened the ICE.
b. The ice KITTIKUTTENED <the ice>
c. # The ICE kittikutttened <the ICE>

A similar effect was discovered with three-syllable-long unaccusative verbs with initial stress:

- (85) a. The ice CRYSTALLIZED <the ice>
b. # The ICE crystallized <the ICE>

However, three-syllable unaccusative verbs with final stress²⁹ show the usual pattern: the subject is prominent.

- (86) a. The TIN decomposed <the TIN>
b. # The tin DECOMPOSED <the tin>

When considering verbs with medial stress, the judgements become unclear:

²⁸ Another exception includes the unaccusative verb “escape” which takes two arguments (this example was taken from Legate, 2003: 508, ex. 3):

- (a) The answer escaped the PROFESSOR <escaped> <the answer>
(b) # The ANSWER escaped the professor <escaped> <the ANSWER>
(c) The answer ESCAPED him <ESCAPED> <the answer>

The (a) and (b) examples are predicted straightforwardly since “professor” is the rightmost in-situ constituent. However, there are no in-situ constituents in (c), and yet the rightmost constituent, “answer”, is not prominent. Instead the verb “escaped” is prominent. This exception is noted but will not be accounted for here.

²⁹ The prosody isn’t the only factor: This verb has a prefix. Possibly only three-syllable monomorphemic verbs participate in this prominence shift effect then.

- (87) a. ? The ICE diminished
 b. ? The ice DIMINISHED

The same effect is seen with wh-movement from clause-final position, and possibly with passives (see Appendix C).

A similar effect of prosody is seen in movement of the head of a restrictive relative clause (Grimshaw, p.c.). If the verb is bisyllabic and stress-final, then it is prominent, as in (90) below. If the verb is monosyllabic, as in (88), or bisyllabic and stress-initial, as in (89), then the final NP-chain is prominent:

- (88) a. We need the X-RAYS that he left <the X-RAYS>
 b. # We need the x-rays that he LEFT <the x-rays>
 (89) a. We need the X-RAYS that he promised <the X-RAYS>
 b. # We need the x-rays that he PROMISED <the x-rays>
 (90) a. We need the x-rays that he FORGOT <the x-rays>
 b. # We need the X-RAYS that he forgot <the X-RAYS>

What all of these cases mentioned above share, is that if the surface-final prosodic word is of a minimum size, the prominence is on that word, even if there is a clause-final copy, better right-aligned in the syntax. There is no similar effect with non-final prosodic weight. Subjects can never be made prominent based on their prosodic status for example. This is illustrated below with for unergatives.

- (91) a. Bill RAN
 b. # BILL ran
 (92) a. Alexander RAN
 b. # ALEXANDER ran

The subject in (92), “Alexander”, is four syllables long, but it cannot be prominent without introducing contrastive focus.

We see the same behaviour when a manner adverb is added. Regardless of the prosodic weight of the non-final word, the prominence is always seen on the final word, whether this is the verb or the adverb:

- (93) a. The ice loudly BROKE
 b. # The ICE loudly broke
 c. # The ice LOUDLY broke
 (94) a. The ice mysteriously BROKE
 b. # The ICE mysteriously broke
 c. # The ice MYSTERIOUSLY broke

- (95) a. The ice broke LOUDLY
 b. # The ICE broke loudly
 c. # The ice BROKE loudly
- (96) a. The ice volatilized quickly
 b. # The ICE volatilized quickly
 c. # The ice VOLATILIZED quickly

This demonstrates that the prosodic effect only acts when it can shift prominence rightward, closer to the right clause edge. This suggests that there are separate forces in syntax and in prosody, both conspiring towards the same goal: Sentential prominence is rightmost in English sentences.

One possible account of these facts concerns the amount of prosodic material intervening between the members of the syntactic chain. In all of these cases, if one word has an extra syllable or if a functional X^0 is replaced with a lexical X^0 , the stress defaults to surface-final: In (55) and (58), we saw that changing a pronominal direct object to a full NP shifts the prominence from the chain onto the surface-final verb. An alternative explanation could be that the addition of this NP introduces one too many ω 's, thus forcing an additional φ . This additional φ , in turn triggers the violation of a constraint that limits the surface distance of the main prominence from the right edge of the clause. It is feasible that a separate prosodic constraint on edge-alignment of prominence exists, whose effect is overwritten by the syntactic alignment constraint discussed in this account under most circumstances.

Effects of prosodic size are seen in other domains: Feet are maximally binary for example in most accounts. Selkirk (2000, 2009) shows that constraints on the size of φ 's are relevant. Constraints BINMIN and BINMAX are posited that place lower and upper binary limits on the size of prosodic constituents, such as φ 's. If this is the case, one possible avenue of exploration towards a resolution for these problematic cases in (53) to (64) above is regarding these constraints on the size of φ 's.

Whatever the case, it is clear, that the syntactic account offered above is not sufficient alone to account for the data presented here. This section showed that prosody plays a crucial role: Prosodic words of a minimum size attract sentential prominence when they are clause-final, regardless of whether there is a null copy present at the right clause-edge.

3 Alternative Accounts of Sentential Stress

3.1 A Comparison with Phase-Based Theories

Legate (2003), Kratzer & Selkirk (2007), and Kahnemuyipour (2009) have posited that sentential prominence is derived cyclically at the syntactic phase. Phase domains are posited to be cohesive chunks of syntactic structure, such that when a given phase-head merges, its complement is shipped off to PF for spell-out (Chomsky, 2001). In

Chomsky's original formulation, only C^0 and v^* (any v^0 that has an external argument) constitute phase-heads. Legate, Kratzer & Selkirk, and Kahnemuyipour posit a syntactic process that assigns prominence at spell-out (when the phase-head is merged). The accounts differ on both the kinds of empirical data covered, and the way in which the data is accounted for. A short summary of the predictions of Legate's and Kahnemuyipour's accounts on sentences with unergative and unaccusative verbs is given at the conclusion of this section. A more detailed discussion of these two accounts is given, along with their predictions concerning the data introduced here. The phase-based accounts are compared with the OT account in terms of the empirical coverage and the theoretical predictions they make.

3.1.1 Legate (2003)

Legate (2003) posits that prominence is assigned to the final stress-bearing constituent in a phase, at the point the phase-head merges.³⁰ Her system is designed to account for movement of clause-final constituents. She uses the stress facts in English unaccusative and passive verbs to argue that unaccusative and passive v^0 are phase-heads, contra Chomsky (2001). She argues for a contrast between cases of short object movement, argued to occur prior to the phase-head merging, and cases of movement outside of the phase. In short movement, since the movement applies before spell-out, the prominence is assigned to the surface final constituent. This is illustrated below.

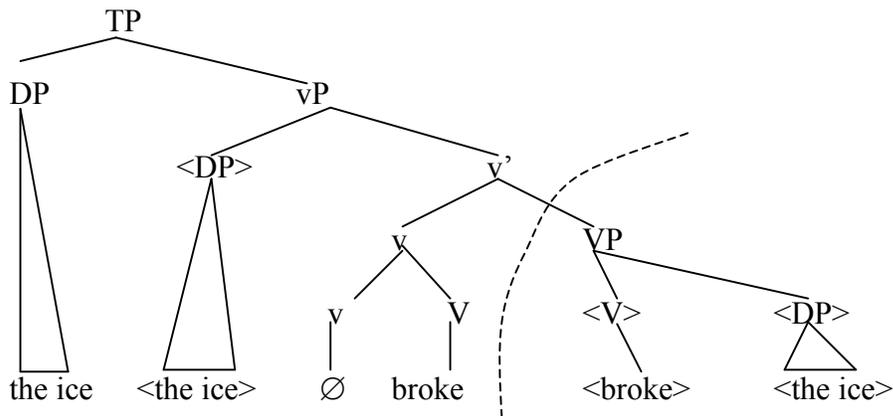
- (97)³¹
- a. I'll look up MARY, when I'm in Toronto.
 - b. I'll look her/?Mary UP, when I'm in Toronto.
 - c. Please put away the DISHES.
 - d. Please put them/?the dishes AWAY.

However, with non-short movement, the moved constituent is final at the point that spell-out occurs, and is marked for prominence at that point. It is then re-merged in the next phase, prominence in tow, to a position outside the phase domain. If unaccusative and passive v^0 's are phase-heads, this explains why their subjects are prominent: They were final in the phase-domain at the time of spell-out.

³⁰ Kratzer & Selkirk (2007) and Kahnemuyipour (2009) both have a very different formulation: They posit that the "highest" phrase in a phase domain receives prominence in that spellout domain. Legate is essentially assigning prominence to the lowest phrase in the spellout domain, on the other hand.

³¹ Taken from Legate (2003 p. 512, ex. 10).

(98) Legate's Account of unaccusatives



It is crucial that the moved object land at the edge of the phase domain so that it is available for movement, once the phase-head's projection is closed off. The assignment of prominence needs to precede the "closing-off" in other words. Since the phase domain remains "open" until the phase-head projection is merged with a distinct syntactic X^0 (T^0 in this case), it is possible for the object to escape the phase domain with sentential prominence, by moving to the edge of spec-vP.

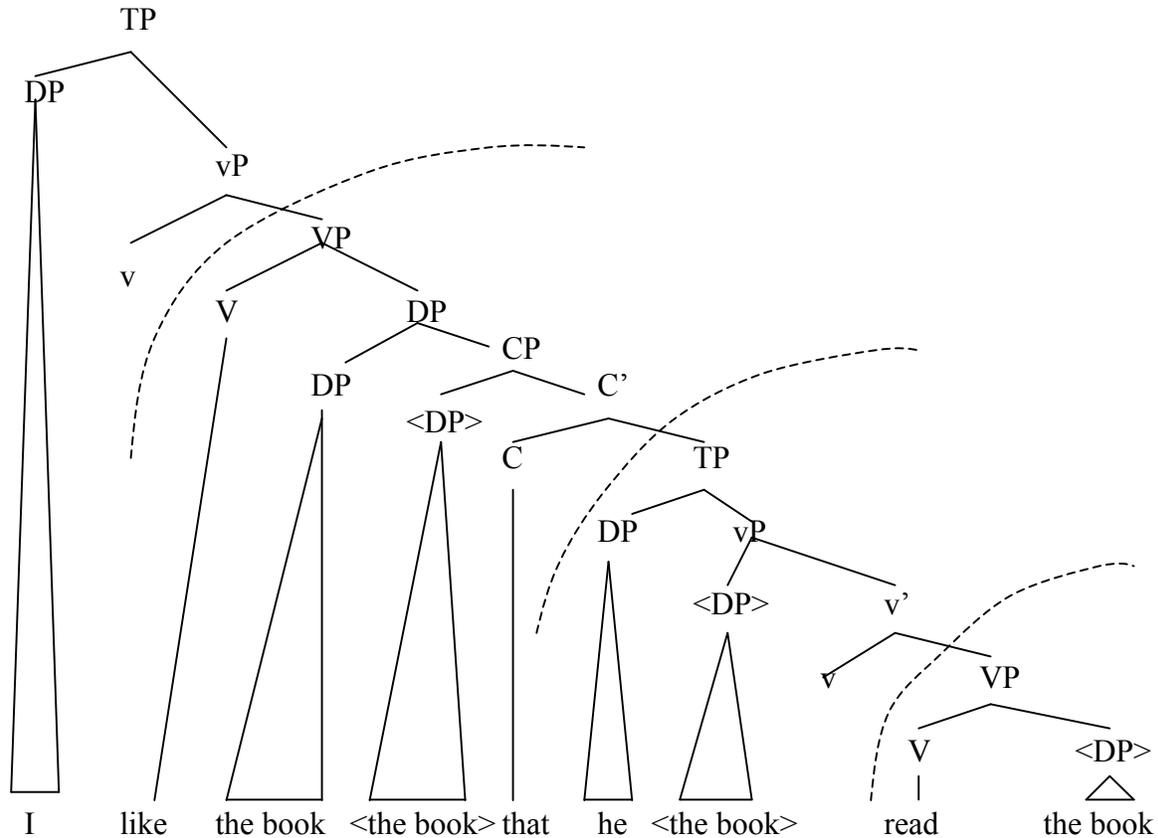
In the OT account presented in section 3, there is no reference to syntactic phases. Instead, the constraint *Null [PROM] prefers prominence on constituents that remain in-situ. However, there are many similarities between the OT account in section 2 and Legate's account. For example, both accounts identify a rightmost syntactic constituent as most prominent. The OT account also mirrors Legate's solution in assigning the prominence of a chain to the copy in the final position. The main difference then is that Legate relies on both the presence of syntactic phases and details of movement. The OT account here only relies on the details of movement however. As long as the copy theory of movement is adopted, the OT account can account for the empirical facts of sentential stress in English.

Another difference between the OT account and Legate's account is that Legate's domain for prominence assignment is cyclic. On the other hand, the OT account utilizes alignment to the clause, a static, fixed domain. Since phase domains are built every time a phase-head is merged, Legate can in principle assign more than one prominence, one per merged phase-head in fact, and the assignment is ordered with respect to merge operations in the derivation. This is a property shared by all phase-based accounts. For example, Kratzer & Selkirk (2007) account for German data, where they claim there are often two or more prominences, in fact.³² At a higher phase, C^0 for example, the

³² Comparison of the OT account with Kratzer & Selkirk's is difficult, since it's not clear they are accounting for sentential stress or for phrasal stress, of which there can be multiple instances in a given sentence in English, as Kahnemuyipour (2009) points out. If they were accounting for phrasal stress, then they would naturally ignore the most prominent word in a sentence. However, they do not spell out whether this is the case or

rightmost constituent should also be stressed here. This is illustrated in a case of movement from a final position in a restrictive relative clause below:

(99)



There are three phase-heads in (99). At the point that the lowest v^0 is merged, “book” is final and receives prominence in the phase domain. The next phase-head merged is the C^0 . Legate does not spell out what happens in cases like this where more than one phase domain is involved. An attempt is made here to spell out one version of what might happen in this derivation: In order for the DP “the book” to move into its surface position, it will have had to move into spec-vP³³, to escape the previous phase domain prior to spell-out.

At the second phase, then, under the assumption that lower phase domains are closed off to spell-out, the rightmost stressable constituent is again the DP “the book”. It should

whether German really does have two main prominences in a sentence. Since Kratzer & Selkirk’s proposal is similar to Kahnemuyipour’s in spirit, I will treat only Kahnemuyipour’s here, since it is tested on English data.

³³ Assuming the predicate-internal subject hypothesis, the lower copy of “he” is already occupying spec-vP, however (this isn’t shown, but can be assumed). Assume that an outer spec position is available for “the book” to move through then.

then be assigned prominence a second time, according to the proposal. This kind of prominence assignment would predict that the rightmost stressable constituent in the phase that is “final” in the derivation will be prominent. While it so happens in (113) that “the book” is actually the final stressable constituent in all three phases, this will not work in cases without movement. Consider the sentence “Bill likes [the book that [is blue]]”, with the two phase domains marked. The final phase-head is the v^0 “likes”, and “book” is predicted to be prominent since it is the final stressable constituent in the highest phase. This is true because the lower phase domain is closed off at the time the prominence is being assigned at the higher phase, and so while “blue” is final on the surface, it is outside of the highest phase domain.

A solution to this problem, basically the one that is adopted in the OT account here, is to stipulate that the assignment of prominence happens only once, at the lowest phase, such that “book” is assigned prominence once and for all in (113) above. The once-and-for-all nature of prominence assignment should ideally be derived. However the OT account also stipulates this by ensuring that [PROM] is assigned once per MC as a property of GEN. Legate might adopt this same stipulation, replacing the MC with the phase domain. Once this move is made, however, the phase domain is essentially doing no work at all in the account since the rightmost stressable constituent at each phase coincides with the rightmost stressable constituent of the clause. Reference to the phase edge can be replaced by reference to the clause edge in this case, with no loss of predictive power. Therefore, if the phase is part of the explanation for prominence assignment, it is necessary to adopt the kind of solution mentioned in the previous paragraph, where each phase domain becomes inaccessible to higher phases. As mentioned this can account for cases of movement, but runs afoul with cases with no movement and multiple phases.

3.2 *Kahnemuyipour (2009)*

Turning now to Kahnemuyipour (2009), prominence is assigned to the “highest” phrase in the phase domain, instead of the final stressable element in a phase domain:

Kahnemuyipour (2009: 68, ex. 2): “Sentential Stress Rule:

Sentential stress is assigned at the phase to the highest phonologically non-null element (i.e. the phonological border) of the spelled out constituent or the SPELLEE.

[_{HP} XP [H YP]]: If HP is a phase, YP = SPELLEE”

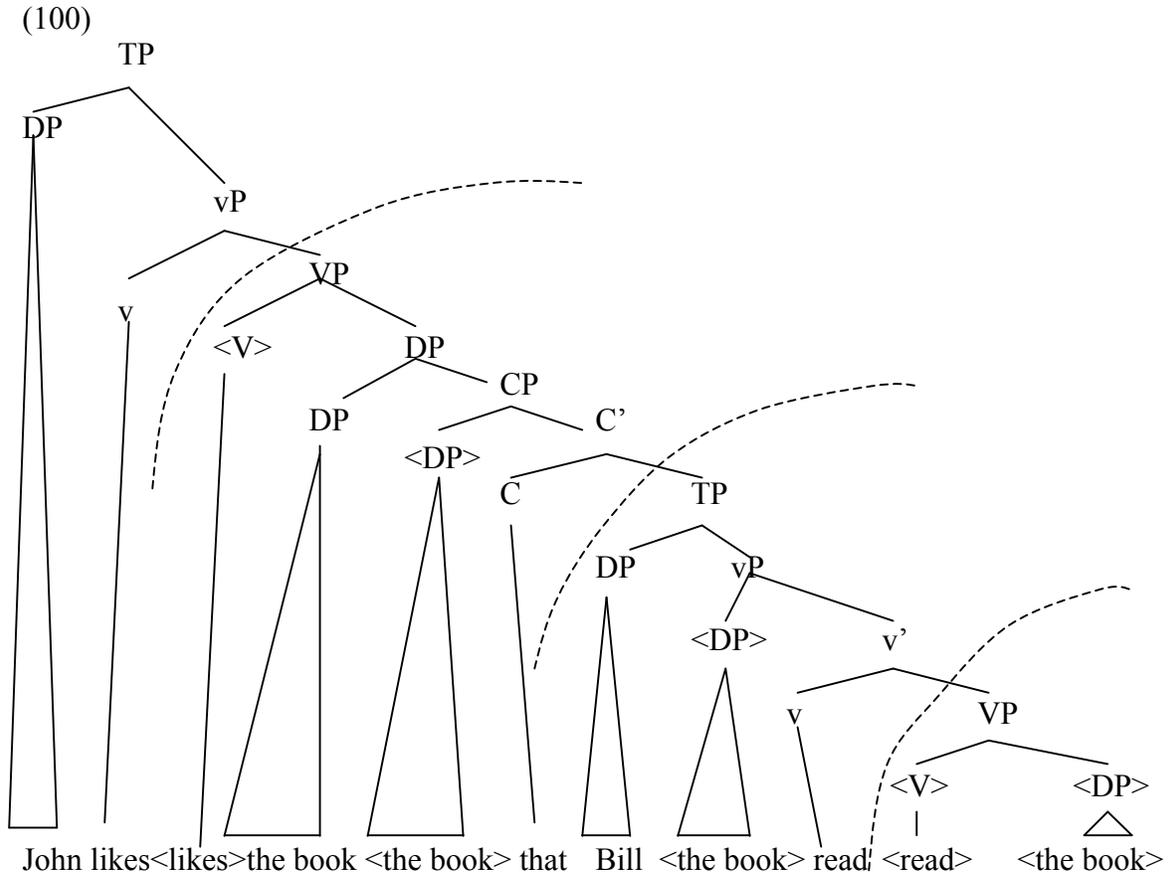
First, a note on this system: The notion of “highest” is determined via asymmetric c-command. Element X is “higher” than element Y if it asymmetrically c-commands or dominates Y. The “highest” element is the element that asymmetrically c-commands or dominates as many other elements as possible, without being dominated or asymmetrically c-commanded, itself. This assumption is coupled with the assumption that passive and unaccusative v^0 s are not phase-heads, so that the prominence difference between unaccusatives on the one hand and unergatives and transitives on the other, is a difference of phase-hood. Movement does not feed prominence assignment then for Kahnemuyipour, and his account differs from both Legate’s and the OT account in that

respect. Instead, the overt position of a phrase determines whether it is prominent. This aspect of his account will not handle the many cases in English shown above, where a final argument is moved. A summary of how Kahnemuyipour accounts for unaccusatives and unergatives is given at the end of this section.

Kahnemuyipour, like Kratzer & Selkirk, allows for multiple prominences, noting that these are in fact secondary prominences (Kahnemuyipour, 2009:119-120). For example, in a transitive sentence, the subject, occupying spec-TP is the highest (and only) phrase in the higher phase domain, while the object is the highest (and only) phrase in the lower phase domain. He notes that while the object is the most prominent, the subject is more prominent than the verb. Kahnemuyipour's account thus predicts all the phrase-level prominences, rather than the single sentential prominence, a major difference in the goals of Kahnemuyipour's account and the OT account.

In fact, Kahnemuyipour attributes the main sentential prominence to the phonological component, noting that in every case he has described, the rightmost of the syntactically determined secondary prominences is elevated to primary status. Therefore, even in a phase-based account, the ultimate assignment of sentential stress must reference the right edge in some form.

Kahnemuyipour's conclusion that the rightmost phasal prominence is the main sentential prominence does not hold in cases of clause-final movement. When a syntactic chain occurs across a longer distance than the simple unaccusative or passive cases, Kahnemuyipour's "rightmost" system of assigning sentential prominence makes the wrong prediction: Any time a phrase moves out of a phase domain with another stressable word in it, that moved phrase cannot have sentential prominence in Kahnemuyipour's system, contrary to actual fact. To see why this is the case, consider again, movement out of a restrictive relative clause:



Kahnemuyipour notes that in SVO languages, the object moves to spec AspP, which intervenes between v^0 and V^0 (and importantly is contained inside the v-phase domain). This doesn't matter in (100) above, since the DP object "the book" raises into the matrix clause ultimately and since only the overt position matters in Kahnemuyipour's account. The verb moves from V^0 to v^0 , outside the lowest phase, accounting for the SVO word order in English transitive verbs. This would leave the lowest phase empty. In cases where a phase domain is emptied, rather than just skipping that phase in the prominence assignment, Kahnemuyipour states that the closest phonologically non-null element receives the prominence for that phase. In (100), this would be the verb "read". Other prominences are assigned to "Bill" as the highest phonologically non-null element in the second C-phase, "book" at the higher v-phase, and "John" at the highest phase. Since "read" is the rightmost of these, it should receive sentential prominence according to Kahnemuyipour. However, the actual prominence is on "book" here.

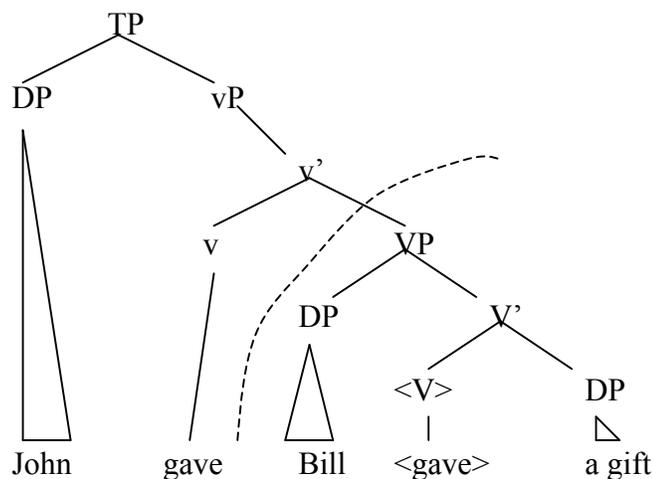
This problem regarding movement out of a phase domain is a general one for Kahnemuyipour's account: If a chain spans a phase boundary, it cannot ever have sentential prominence if there is any stressable element closer to the lowest phase domain than the overt member of the chain. The prominence assigned by the lowest phase will always receive the sentential prominence, since it is rightmost. Either this will be the highest stressable element in that phase domain, or else if that phase domain is empty, it will be the stressable element closest to the phase domain (the rightmost stressable

element on the surface). Therefore it is very difficult to shift the main prominence away from the right edge of the clause in Kahnemuyipour’s account.

The only case where a non-final element is stressed in Kahnemuyipour’s account is where more than one element is present in the final phase. In this case, the highest of these is stressed. The phase domain boundary places an absolute limit on how far prominence can shift from the right-edge and thus cases like (100) above cannot be accounted for. This is what motivated the reference to syntax in the OT account and in Legate’s account: The fact that the prominent element has a copy that is final requires a right alignment constraint to deal with syntactic null elements. This can be done by aligning prominence, here via the [PROM] feature, with a syntactic category, but not with a prosodic category assuming that null copies are present in syntax but not in prosodic parses.

The case of ditransitive verbs is also potentially problematic for Kahnemuyipour. Assuming a VP-shell structure (Larson, 1988), the direct object (“Bill” in (101) below) should be prominent since it is the highest element in the v-phase domain.

(101)



However, the final direct object “gift” is prominent. Kahnemuyipour explains this by positing that the direct object is raised to a position above the vP, with the entire vP then moving to the spec of an even higher functional projection as shown in (102) below. These movements are argued to derive various word orders seen with adverbials, which Kahnemuyipour takes to be stationary, following Cinque (1999). This series of movements leaves the original v-phase empty, with the direct object as the nearest stressable element, deriving the attested prominence fact: Final direct objects are prominent.³⁴

³⁴ Kahnemuyipour offers the same explanation as to why final adjuncts are stressed. Adjuncts are attached outside the v-phase. In all cases where a final adjunct is present, the vP is raised, emptying the phase domain then, allowing prominence to be assigned to

(102) TP[John FP₁[vP_j[gave Bill <gave> <DP_i[a gift]>] F'[FP₂[DP_i[a gift] F' [<vP_j>]]]]]]

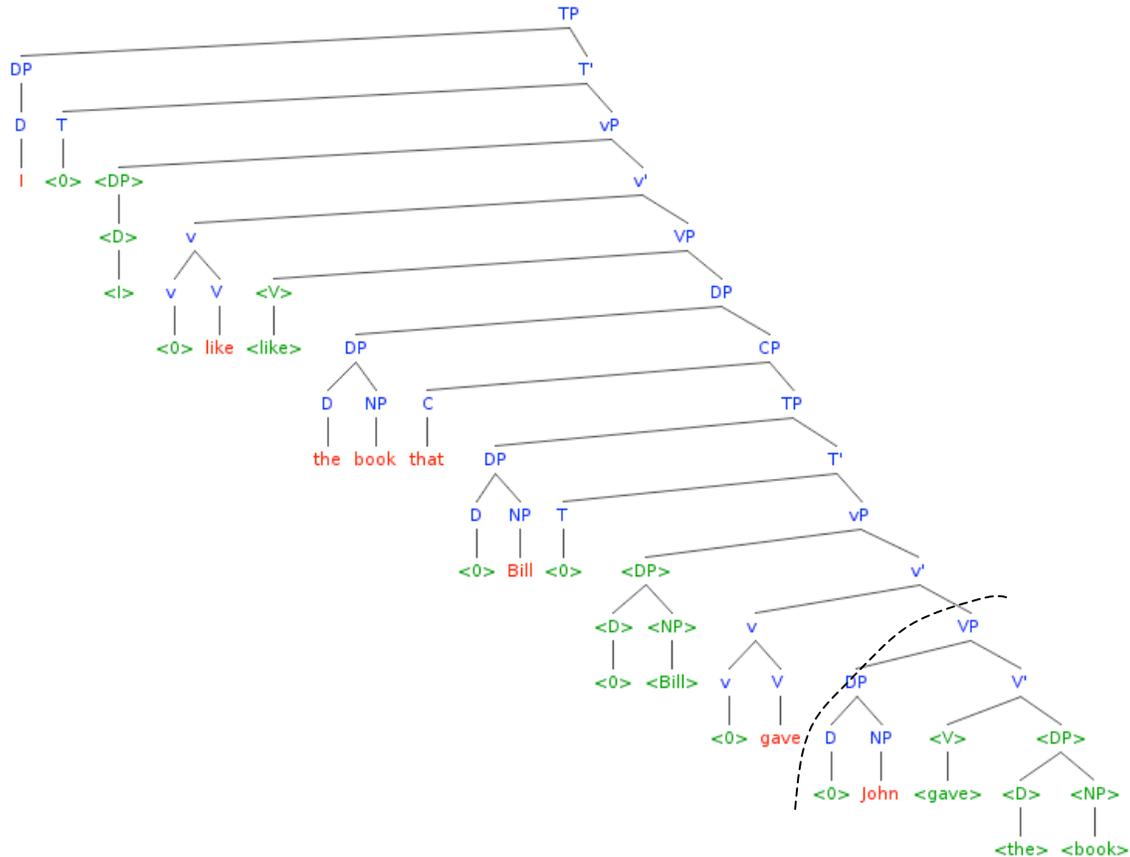
Kahnemuyipour relies on these two movements to explain the stress pattern of ditransitives. However, the OT account is actually compatible with or without these movements: Whatever happens regarding movement, the final direct object leaves a copy in clause-final position, and so ALIGN (MC, R, [PROM], R) will favour a [PROM] direct object. Therefore, while Kahnemuyipour relies on movement to derive surface structures that explain prominence assignment, the OT account relies on the initial merged position to explain prominence assignment. Movement happens for independent reasons in the OT account.

While Kahnemuyipour's account fails to derive cases where prominence shifts with movement, it can capture the cases where prominence did not shift with movement in ditransitives in section 3.4 above. However, it cannot explain the details of the stress shift if the final argument is pronominal.

Recall that in a case where a ditransitive is embedded in a restrictive relative clause, and the direct object is raised, the in-situ indirect object is most prominent as long as it is lexical and not functional. This was shown in (58) above, repeated in (103) below.

the final stressable element in the adjunct. Kahnemuyipour doesn't offer a principle that explains when vP raises and when it does not however. This same issue applies to the solution in section 2.5 for the adverb cases.

(103) I like the book that Bill gave JOHN <gave> <the book>



Assuming the structure in (102) was responsible for the prominence on “book” due to it being the closest phonologically non-null element to the emptied phase domain, then raising “the book” will leave “John” as the only phonologically non-null element inside the phase domain. The problem here is that if we replace “John” with “him”, Kahnemuyipour’s account will incorrectly predict that the prominence will shift to the nearest stressable element to the phase domain edge; i.e. onto “gave”. In fact the stress shifts to “book” though, as seen in (58) above, repeated in (104) below.

(104) I like the BOOK that Bill gave him <gave> <the BOOK>

Therefore Kahnemuyipour’s account doesn’t derive the correct location of sentential prominence in cases with a ditransitive verb with a pronominal indirect object and a raised direct object, such as in (104) above.

Importantly, it is not the fact that Kahnemuyipour refers to phase domains that cause his account to run afoul with examples like (104). It would be possible to posit a phase-based account that would handle such cases of movement. Instead, the problem resides in his system of assigning prominence when his phase domain is emptied via movement. Kahnemuyipour defaults to the rightmost surface element as the prominent element. In fact, though, as we have shown, it is the rightmost element that is prominent, whether that

element is overt or otherwise. In the case above in (104), the null copy of “book” is rightmost in the relevant sense, not the overt verb “gave”.

The OT account offered in the previous section is able to explain the data in (103) and (104). What cases like (103) have, that cases like (104) do not, is an overt lexical in-situ argument. *Null [PROM] favours [PROM] on the N^0 , “John” and since it is ranked above alignment, the N^0 , “John” is optimally selected as the [PROM] constituent. However in (104), there is no lexical in-situ element³⁵. Therefore, ALIGN (MC, R, [PROM], R) applies, favouring the rightmost syntactic X^0 , the N^0 “book”, being [PROM].

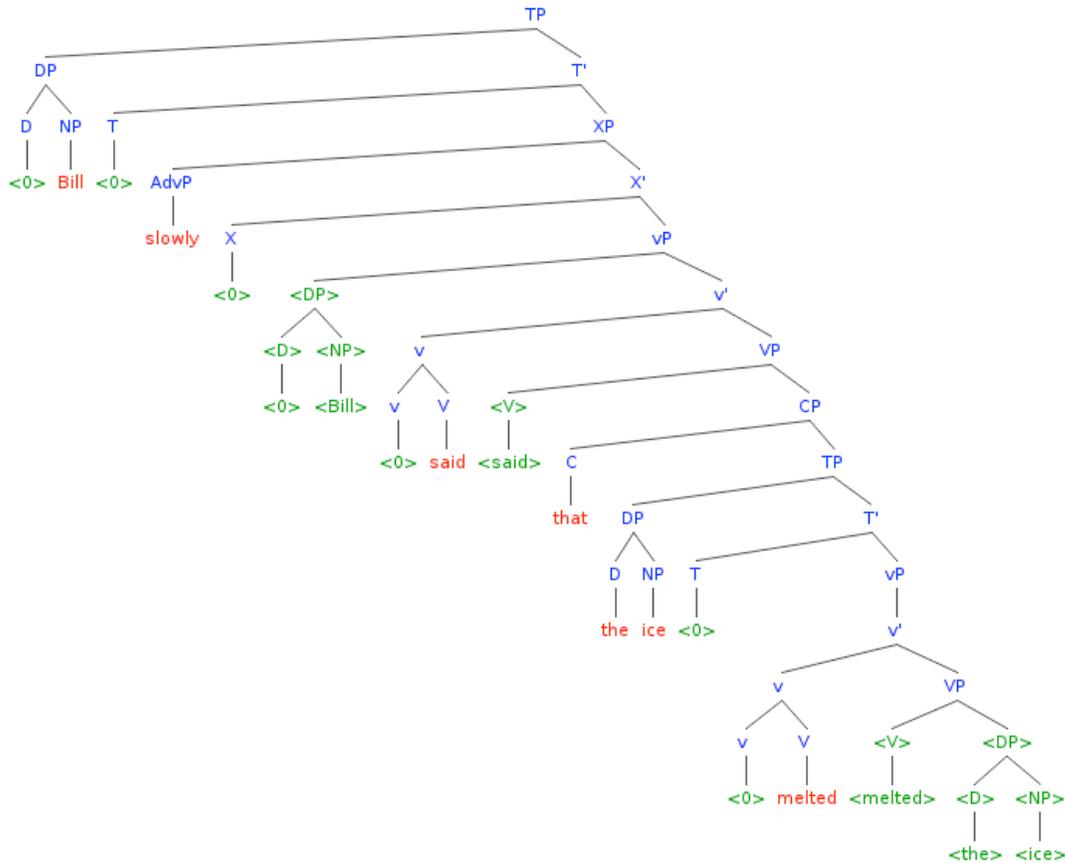
Importantly, while I have shown that the set of data given in section 2 above cannot be captured in either Legate’s or Kahnemuyipour’s accounts, this doesn’t imply that there is no phase-based account that can explain these data. In fact, replacing the account built around *Null [PROM] with a similar system that instead uses phase domains can work. In all of the previous examples, the rightmost in-situ element has also been within the lowest phase domain. An alternative phase-based account then could capitalize on this fact, rather than the fact that the object does not move.

The data in this paper are ambiguous in terms of which of these two explanations are correct. What is needed is a case where the rightmost lexical in-situ X^0 is merged outside of the lowest phase domain, but where there is an overt lexical X^0 , that has a lower null copy within that lowest phase domain. The phase-based account would predict that the lower X^0 should be [PROM] since it’s inside the lowest phase domain. The in-situ-based account would predict that the higher X^0 should be [PROM], since it is the rightmost in-situ element.

An example that fits this requirement is given in (105):

³⁵ Since “him” is functional, it cannot be [PROM] via the undominated LCC.

(105) Bill slowly said that the ICE broke <broke> <the ICE>



Here, the only in-situ lexical X^0 is “slowly”. However, the sentential prominence is on “ice”. The OT account offered here would incorrectly optimally select a candidate with [PROM] on “slowly”. However, the phase-based account could place the sentential stress on “ice” if, for example, the rightmost syntactic constituent within the lowest phase domain is the [PROM] element (a hybrid between Kahnemuyipour and the present OT account). Another potential explanation does exist though: A higher ranked constraint that requires [PROM] to be in the rightmost CP might prevent the adverb from being [PROM]. So even this example in (105) has an alternative explanation to a phase-based one. Either way, (105) does require further explanation as the OT account gives too much prominence-attraction power to in-situ elements. Clearly some other constraint must exist, be it a phase-domain referring constraint or a clause-referring constraint, in order to prevent a situation like (105) above, with in-situ elements pulling prominence too far off the right edge.

In summary, the phase-based accounts of Legate (2003) and Kahnemuyipour (2009) assign multiple prominences, one per phase domain. A separate principle is needed to assign the main sentential prominence among these. Differences are predicted whenever there are multiple XP’s in a given phase domain then. In the phase-based account, it must be the case that one of these is prominent with respect to the others. In the OT account,

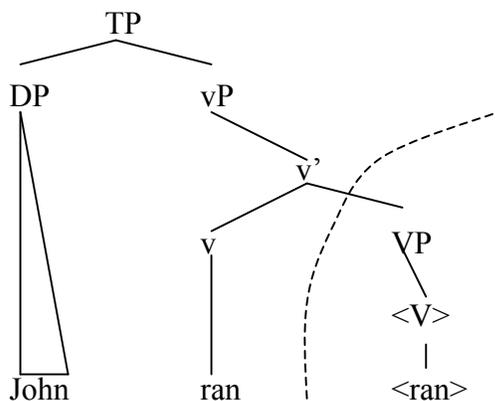
only a single prominence is assigned via the syntactic feature [PROM]. If the multiple phase-based prominences do correspond to secondary stresses, then the main differences in prediction between the two accounts concern predictions of secondary prominences and not the distribution of the main prominence. The data presented here require an analysis that assigns prominence to syntactic elements, which can be null, in order to account for prominence on constituents that were clause-final prior to movement, following Legate. Kahnemuyipour's phase-based account fails to account for these cases of movement, not because of his reference to phase domains, but because of the reference to surface positions.³⁶ While a phase-based account can account for the English data presented in this paper, I argued that the *Null [PROM] account is better, since it relies only on assumptions of movement, which the phase-based account must do anyway. Occam's razor would favour the solution that requires fewer assumptions over the one that uses a superset of these assumptions to achieve the same results.

Following is a summary of Legate's (2003) and Kahnemuyipour's (2009) predictions for unergative and unaccusative verbs, respectively.

(106) Unergative Verbs – Verb prominent

a. Legate (2003) – The correct prediction is made since a copy of the verb is final in the v-phase-domain. It is assigned main prominence when it re-merges, closing off the phase domain; although Legate doesn't explicitly assume V-to-v movement, her account is consistent with it.

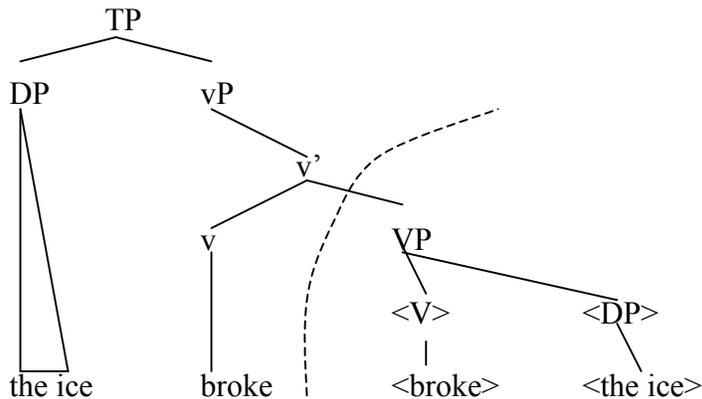
b. Kahnemuyipour (2009) – The correct prediction is made since the verb is the closest phonologically non-null element to the emptied v-phase domain, and it is the rightmost prominent element in the sentence. "John" receives secondary prominence since it is the highest stressable element in the higher phase domain.



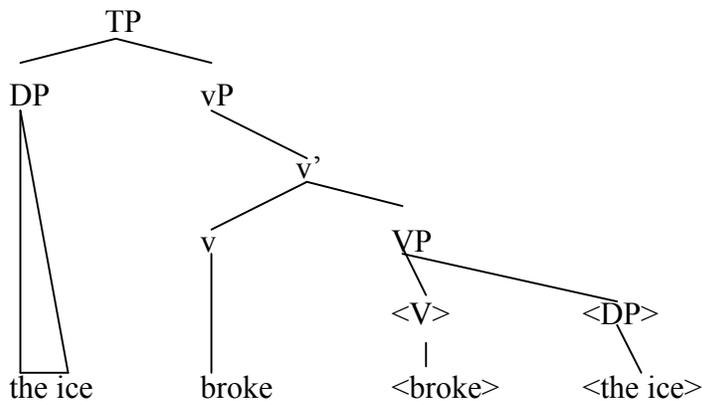
³⁶ This argument is the same one that would prevent an alternative account using only prosodic constituency. The correct facts concerning movement must reference syntactic constituents since null constituents appear to determine the location of sentential prominence. These null constituents are present in the syntax, but lack prosodic structure.

(107) Unaccusative Verbs – Subject prominent

a. Legate (2003) – The correct prediction is made since the subject has a lower copy that is the final element in the lower phase. It then reemerges in subject position with the prominence that was assigned in the lower phase.



b. Kahnemuyipour (2009) – The correct prediction is made. Unaccusative v-heads are not phase-heads, and so when the DP subject merges it is in the highest position in the phase domain (of C^0), and therefore it is the only prominent element in the sentence.



4 Conclusion

The sentential prominence in clauses (here, assumed to be the MC) is accounted for in English. A feature, [PROM] is located in the syntactic component that is then interpreted in the phonological component as the position of main prominence. An OT account was outlined that could account for the location of prominence in a variety of clause-types. In declarative sentences without movement, the rightmost lexical X^0 is most prominent. This was accounted for by ranking ALIGN (MC, R, [PROM], R) above ALIGN (MC, L, [PROM], L). In sentences where the rightmost syntactic constituent moves to a non-final position, the main prominence is seen on the X^0 that would have been clause-final prior

to movement. This was accounted for since ALIGN (MC, R, [PROM], R) refers to syntactic constituents, including null copies. A clause-final null copy satisfies ALIGN (MC, R, [PROM], R) for a syntactic chain then, allowing sentential prominence that is not surface-final to still be “right-aligned”.

When a clause-final argument is raised out of a ditransitive structure to a non-final position, the other in-situ argument is most prominent. This is predicted by ranking *Null [PROM] above ALIGN (MC, R, [PROM], R). This ranking favours prominence on in-situ constituents over those that form chains with null constituents. Cases where manner adverbs shifted the prominence from the subject to the verb in unaccusatives and passives were accounted for as well. These latter cases depended on details of movement of the verb, and not the adverb however. In summary, the pressure to make in-situ constituents prominent takes priority over the pressure to right-align the prominence with the clause. Some final observations were included that demonstrated the importance of prosody on sentential prominence.

A comparison with the phase-based accounts of Kahnemuyipour (2009) and Legate (2003) showed that those accounts could not explain the full range of data that the OT account was built around. Despite this, it is suggested that a phase-based account that differs from the OT account rather minimally could work: If *Null [PROM] were replaced by a constraint that preferred [PROM] constituents to be in the lowest phase domain, the same predictions could be made. However, the OT account is argued to be the better account since it makes all the same assumptions on movement that would be needed in a phase-based account, but does not require any assumptions on phase-hood to be made. Occam’s Razor would prefer the OT account then.

References

- Bresnan, J. (1972). On sentence stress and syntactic transformations. In M. K. Brame (Ed.), *Contributions to generative phonology* (pp. 73-107). Austin: University of Texas Press.
- Chomsky, N. (2001). Derivation by phase. In M. Kenstowicz (Ed.), *Ken Hale: A life in language* (pp. 1-52). Cambridge: MIT Press. Cinque, G. (1999). *Adverbs and functional heads: A cross-linguistic perspective*. New York: Oxford University Press.
- Gussenhoven, C. (1983). Focus, mode and the nucleus. *Journal of Linguistics*, 19(2), 377-417.
- Kahnemuyipour, A. (2009). *The syntax of sentential stress*. Oxford; New York: Oxford University Press.
- Kratzer, A., & Selkirk, E. O. (2007). Phase theory and prosodic spellout: The case of verbs. *The Linguistic Review*, 24(2-3), 93-135.

- Ladd, D. R. (1983). Even, focus and normal stress. *Journal of Semantics*, 2(2), 257-270.
- Larson, R. K. (1988). On the double object construction. *Linguistic Inquiry*, 19(3), 335-391.
- Legate, J. A. (2003). Some interface properties of the phase. *Linguistic Inquiry*, 34(3), 506-516.
- Levin, B. (1993). *English verb classes and alternations: A preliminary investigation*. Chicago: University of Chicago Press.
- McCarthy, J. J., & Prince, A. (1993). Generalized alignment. *Yearbook of Morphology*, 79-153.
- Nespor, M., & Vogel, I. (1986). *Prosodic phonology*. Dordrecht, Holland; Riverton, N.J.: Foris Publications.
- Nunes, J. (1995). The copy theory of movement and linearization of chains in the minimalist program. University of Maryland).
- Prince, A. and Smolensky, P. (1993; 2004). Optimality Theory: constraint interaction in generative grammar. Report. New Brunswick, NJ: Rutgers University Center for Cognitive Science.
- Prince, A. and Tesar, B. (2010). OT Workplace (version X_11). New Brunswick: Rutgers University.
- Rizzi, L. (1997). The fine structure of the left periphery. In L. Haegeman, ed., *Elements of Grammar: Handbook in Generative Syntax*. Dordrecht: Kluwer, 281-337.
- Selkirk, Elisabeth (1978). 'On prosodic structure and its relation to syntactic structure'. In T. Fretheim (ed.), *Nordic Prosody 2*, Trondheim: TAPIR, 111-120.
- Selkirk, E. O. (1995a). The prosodic structure of function words. In University of Massachusetts occasional papers 18: Papers in Optimality Theory, 439-469. GLSA University of Massachusetts, Amherst.
- Selkirk, E. O. (1995b). Sentence prosody: Intonation, stress, and phrasing. In J. A. Goldsmith (Ed.), *The handbook of phonological theory* (pp. 550-569). Cambridge, Mass., USA: Blackwell.
- Selkirk, E. O. (2000). The interaction of constraints on prosodic phrasing. In M. Horne (Ed.), *Prosody: Theory and experiment* (pp. 231-261). Dordrecht: Kluwer Academic Publishers.
- Selkirk, E. O. (2009). The syntax-phonology interface. In J. A. Goldsmith, J. Riggle & A. Yu (Eds.), *The handbook of phonological theory* (2nd Edition ed.). Oxford: Blackwell Publishing.

Truckenbrodt, H. (1999). On the relation between syntactic phrases and phonological phrases. *Linguistic Inquiry*, 30(2), 219-255.

Appendix A

On Syntax-Prosody Correspondence

Since [PROM] is a feature that is aligned to syntactic constituents, but it is interpreted in the phonological component, a principle is needed that can map syntactic constituents to prosodic constituents. Many accounts posit that this is accomplished via alignment constraints that refer to syntactic constituent edges and prosodic constituent edges (Selkirk, 1995b, 2009; Truckenbrodt, 1999). The OT account summarized in this paper does not delimit prosodic structure, as laid out by these constraints. A given winning candidate is allowed any parse at all that is consistent with the feature [PROM] denoting the main sentential prominence. Prosodic structure is taken as a free parameter then, here, with the account's goal being only to delimit the syntactic position of [PROM].

However, it is still necessary to define a notion of correspondence between syntactic constituents and prosodic constituents. This correspondence relation must be defined in order to ensure that the syntactic feature [PROM] can be interpreted at all in the phonological component. As mentioned, a given candidate will always have one syntactic constituent that is [PROM]. Furthermore, this constituent is required to be in *correspondence* with a prosodic constituent. This step is crucial to ensure the [PROM] feature is interpreted at all in the phonological component – it cannot go unpronounced. Finally, this prosodic constituent is required to be a prosodic head.³⁷

A correspondence relation exists between (prosodic) ω 's and (syntactic) X^0 's and also between φ 's and XP's if and only if the two categories align with each other. Correspondence relations are restricted to ω 's and X^0 's and to φ 's and XP's, following the alignment-based theories of prosody-syntax mapping of Selkirk (1995a) and

³⁷ This latter requirement that the feature [PROM] and the head prosodic word coincide, could potentially be relaxed such that it is a restriction in CON, and not GEN. One could imagine a case where two separate prominences occur: One syntactically defined, the other prosodically defined. In English, I assume that there is a single such prominence and that the two are equivalent as a property of GEN. However, in a language where the two do not coincide, we might imagine the following possibilities: 1) two prominences of equal magnitude; 2) two prominences, but where one (syntactic or prosodic) is more prominent than the other; 3) two prominences, but where the two are expressed via different phonetic interpretations (i.e. higher pitch on syntactic prominence, added duration on prosodic prominence). These possibilities can be allowed by including an alignment constraint, where the syntactic constituent that is [PROM] and the prosodic head constituent must correspond. If this constraint were included in the OT account of English, it would simply be undominated. If languages exhibit any of the three possibilities summarized above, then this constraint would belong in CON, and not GEN.

Truckenbrodt (1999). In these accounts, separate alignment constraints are posited that align ω 's and X^0 's (via morphological roots) on the one hand and φ 's and XP's on the other hand. Correspondence in the OT account relates edges of syntactic structures and edges of prosodic structures. Correspondence of a syntactic constituent and a prosodic constituent is established when the two constituents share the same edges. I will assume that prosodic structure is only built around overt material. Syntactic structure meanwhile does not require overt material.

Since the correspondence relation refers to edges in different domains, some explanation is required as to how this edge mapping proceeds. Syntactic constituents have *syntactic* edges defined as follows.

(108) Syntactic Edges:

A right syntactic edge for a given constituent, ZP is the X^0 that is dominated by ZP such that there is no other X^0 that follows this one and that ZP dominates. A left edge is defined similarly, but such that no other X^0 precedes that X^0 . If the syntactic constituent under question is a terminal constituent, then that terminal constituent itself is both its own left edge and right edge.

Meanwhile, prosodic constituents have edges defined similarly. There are two relevant levels of prosodic constituency here, adopting Selkirk's (1978) prosodic hierarchy. One is the phonological phrase (φ) and the other is the prosodic word (ω). The contact between morphology and syntax is assumed to be at the level of the ω . A correspondence between ω 's and X^0 's is thus established:

(109) Prosodic Edges:

A right prosodic edge for a given φ is the ω that is dominated by that φ , such that there are no other ω 's following it, that are dominated by the same φ . The left prosodic edge is defined similarly then. The prosodic edges for a given ω are made up of the morpheme that the ω corresponds to.

A ω has prosodic edges that are equal to itself, just as X^0 's had syntactic edges that were equal to themselves.

With respect to φ 's, I assume that all φ 's must immediately dominate at least one ω (Nespor and Vogel's Principle 1, 1986:7), and they cannot dominate any other φ 's (Nespor & Vogel's Principle 2). Prosodic edges of φ 's are defined at the level they immediately dominate then: The ω -level.

These two prosodic constituent types correspond to XP's and X^0 's respectively. The correspondence between XP's and φ 's is built in to alignment based accounts of syntax-prosody mapping (Selkirk, 1995a; Truckenbrodt, 1999: 223) by stating these particular categories as the ones the alignment constraints refer to. This account implements this correspondence between XP's and X^0 's via the correspondence relation outlined here.

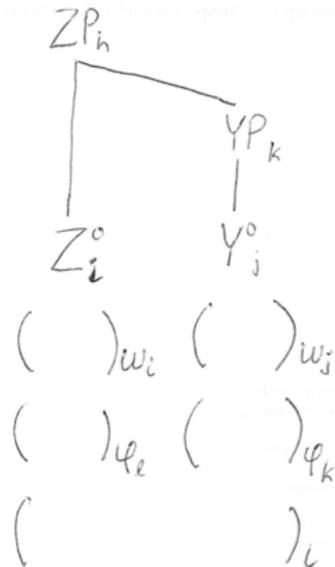
(110) Correspondence between syntactic and prosodic constituents

A correspondence relation holds between a given syntactic constituent and a prosodic constituent if and only if those constituents share identical right and left edges, defined over X^0 's.

The role of correspondence in this account is in limiting the candidate set to those where [PROM] is interpretable in the phonological component: Only candidates with a [PROM] constituent that is in correspondence with some prosodic constituent are generated.

To illustrate how correspondence works, (111) below shows a case where a correspondence exists between the syntactic terminal constituent Z_i^0 and the prosodic word, ω_i .

(111) Correspondence of Syntactic Structure with Prosodic Structure



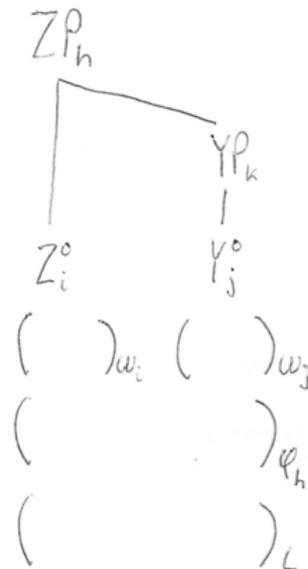
In this case, both Z_i^0 and ω_i are terminal constituents and so they themselves are both the left and right syntactic and prosodic edges, respectively. Therefore Z_i^0 and ω_i correspond with each other. Likewise, the same holds for Y_j^0 and ω_j : They are in correspondence by virtue of their mutual edge-alignment. At the level of the phrase, YP_k is in correspondence with ϕ_k . YP_k has the same left and right syntactic edge, Y_j^0 . Likewise, ϕ_k has the same left and right prosodic edge, ω_j . As mentioned, these terminal constituents are perfectly aligned at both edges, and so this means that YP_k is in correspondence with ϕ_k . This means that candidates where Z_i^0 , Y_j^0 , and YP_k are [PROM] are generated.

ZP_h and ϕ_l do not correspond however, because ZP_h has as its right syntactic edge, Y_j^0 . However, ϕ_l has ω_i as its right prosodic edge, which is in turn aligned with Z_i^0 , creating a misalignment. Therefore, since ZP_h and ϕ_l do not correspond. This, in turn, means that there is no candidate generated where ZP_h is [PROM].

In this way, a correspondence between syntactic constituents and prosodic constituents is established. This correspondence relation allows the phonological component access to the [PROM] feature, which is aligned in the syntax. A candidate with a [PROM] syntactic constituent is interpreted with the prosodic correspondent of that [PROM] constituent as the head prosodic constituent in the output. For example if [PROM] were attached to Y_j^0 above, this would mean that as a property of GEN, ω_j is the head ω of φ_k , and further that φ_k is the head φ of the ι . This headedness relation in the prosody is what leads to phonetic prominence.

An interesting variation of (111) above has a single φ , rather than a pair of φ 's. Consider (112) below.

(112)

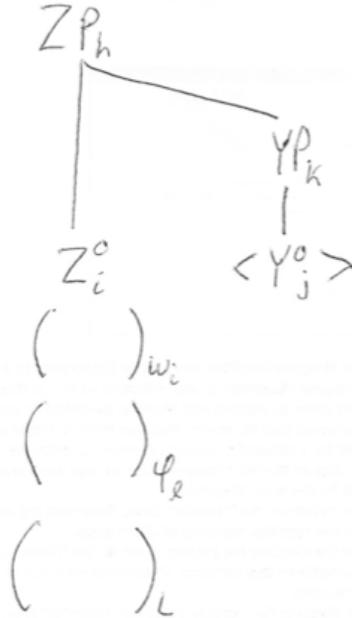


In this case, there is a correspondence between ZP_h and φ_h , both of which dominate two constituents. This situation is the only one where prosodic constraints could potentially have a say on the location of the main prominence: If ZP_h is [PROM], then this only imposes the requirement that φ_h be the head φ of the ι . It does not pose any restriction at all on which prosodic word is the head ω of that φ : The main prominence might be on ω_i or it might be on ω_j then. Either is allowed and the constraints introduced so far make no choice between these candidates.

Turning now to cases with chains, separate restrictions hold in GEN and in CON, both violated by null [PROM] constituents. These restrictions are outlined along with their consequences on the location of [PROM]. In a chain, the lower copy is phonologically null and the higher copy is pronounced. Following Legate's (2003) account, a chain with a clause-final null copy can be assigned sentential prominence via assignment of [PROM], since the position of the null copy determines the right-alignment of the entire chain. GEN assigns [PROM] to all members of a syntactic chain. This allows for

candidates containing a [PROM] null copy then, a potentially problematic candidate, given the need for correspondence in syntax and prosody, as outlined above. To see how this case is handled in this account, consider two cases with phonologically null syntactic constituents. First, consider a case like (113) below, with a final phonologically null syntactic X^0 .

(113) Correspondence with phonologically null syntactic constituents

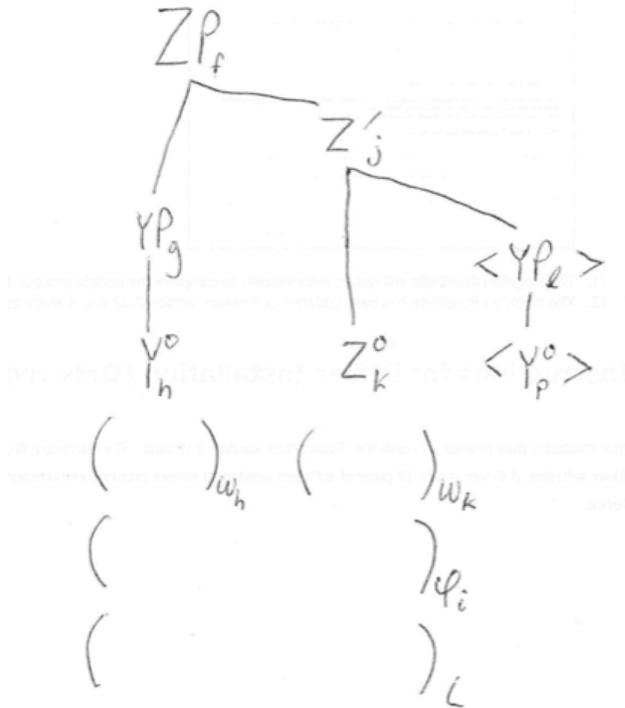


$\langle Y_j^0 \rangle$ has no prosodic correspondent. GEN therefore rules out a candidate where $\langle Y_j^0 \rangle$ is [PROM]: If a syntactic constituent is unpronounced it cannot be prominent on the surface. As a result, no candidate can have [PROM] on a null X^0 as a property of GEN. Candidates with a structure like (113) are generated only with [PROM] on ZP_h or to Z_i^0 .

However, in candidates with [PROM] chains, as long as one of the members is overt, the prominence can be pronounced, and thus GEN allows this candidate. Consider (114) below.

(114) Correspondence with chains³⁸

³⁸ Here, indices indicate syntax-prosody correspondence, rather than chain-identity. Chain identity is shown here by using the same syntactic label “Y” or “Z” for example.



A candidate where the chain, Y^0 , is [PROM], is allowed in GEN since the higher copy of Y^0 is in correspondence with a ω (ω_h).³⁹ Therefore, a distinction is drawn between candidates with [PROM] chains that do not contain an overt member (as in (113)) and candidates with [PROM] chains that contain at least one overt member (as in (114)). GEN does not allow the former, but allows the latter.⁴⁰

It could be argued that the restriction banning [PROM] on null constituents should be present in CON only, and not also in GEN. In fact, *Null [PROM] is alarmingly similar to the restriction in GEN: Both are violated by null elements that are [PROM]. Moving the restriction from GEN to CON has some potentially unwanted consequences though. This move would predict that there could exist a language where this constraint can be violated. In such a language, clauses would lack sentential prominence in precisely cases where a final null syntactic constituent is [PROM].⁴¹ In this hypothetical language, alignment of [PROM] in syntax is more important than pronouncing it, and it would simply be deleted without expression in the phonological component. I acknowledge this as a possibility, but set it aside for now, in pursuit of an account of English, where the facts are clearly different. While it might be that this restriction belongs in CON, and not in GEN, I assume separate constraints in GEN and in CON here: Universally, [PROM]

³⁹ Importantly, correspondence relations hold of individual members within chains, rather than chains themselves.

⁴⁰ Theoretically, chains with more than one overt member are possible. The OT account does not attempt to account for any such candidates.

⁴¹ An alternative explanation would be to place both restrictions in CON but to impose a universal constraint ranking such that the constraint I have in GEN universally dominates the one in CON.

requires overt expression, but it is marked on chains with null members. This assumption would be proved incorrect, and only a single constraint in CON would be warranted, if a language showing the property described above were to exist.

While they share the same basic force, the two restrictions banning null constituents in GEN and CON are not quite the same. Therefore, even if we move the aforementioned restriction on null prominence into CON, two separate constraints are still needed. *Null [PROM] is violated whenever a chain contains covert elements. The restriction in GEN, on the other hand, is violated only when a chain does not contain any overt elements. So while it is universally ill formed to have a [PROM] chain with *no overt* elements, it is marked but tolerated to have a [PROM] chain with *some covert* elements. The two constraints can be thought of as constraints that differ in their relative logical perspectives that they take towards banning null constituents then.

Appendix B

Legend for Representations:

[z]: Denotes a lexical [PROM] constituent, z
(z): Denotes a functional [PROM] constituent, z
<Z>: Denotes a phonologically null constituent, z
f: Denotes a functional X^0
x: Denotes a lexical X^0

OT Workplace Constraint Macros

Script for LCC

```
Function LCCAlt(rw As Long) As Long
Dim i, j As Long, count As Long
Dim hold As String
hold = Cells(Abs(rw), OutputCol).Value
```

```
For i = 1 To Len(hold) Step 1
  If Mid(hold, i, 1) = "(" Then
    count = 1
    Exit For
  End If
Next
LCCAlt = count
End Function
```

Script for *Null [PROM]

```
Function NoNullPromAlt(rw As Long) As Long
Dim i, j, k As Long, count As Long
Dim hold As String
hold = Cells(Abs(rw), OutputCol).Value
```

```

For i = Len(hold) To 1 Step -1
  If count <> 1 Then
    If Mid(hold, i, 1) = ")" Or Mid(hold, i, 1) = "]" Then
      For j = i To 1 Step -1
        If Mid(hold, j, 1) = ">" Then
          count = 1
          Exit For
        ElseIf Mid(hold, j, 1) = "(" Or Mid(hold, j, 1) = "[" Then
          Exit For
        End If
      Next
    End If
  ElseIf count = 1 Then
    Exit For
  End If
Next
NoNullPromAlt = count
End Function

```

Script for ALIGN (MC, R, [PROM], R)

```

Function AlignPromRAlt(rw As Long) As Long
Dim i As Long, count As Long
Dim hold As String
hold = Cells(Abs(rw), OutputCol).Value

```

```

For i = Len(hold) To 1 Step -1
  If Mid(hold, i, 1) = "x" Or Mid(hold, i, 1) = "f" Then
    count = count + 1
  ElseIf Mid(hold, i, 1) = ")" Or Mid(hold, i, 1) = "]" Then
    Exit For
  End If
Next
AlignPromRAlt = count
End Function

```

Script for ALIGN (MC, L, [PROM], L):

```

Function AlignPromLAlt(rw As Long) As Long
Dim i As Long, count As Long
Dim hold As String
hold = Cells(Abs(rw), OutputCol).Value

```

```

For i = 1 To Len(hold) Step 1
  If Mid(hold, i, 1) = "x" Or Mid(hold, i, 1) = "f" Then
    count = count + 1
  ElseIf Mid(hold, i, 1) = "(" Or Mid(hold, i, 1) = "[" Then

```

```

Exit For
End If
Next
AlignPromLAlt = count
End Function

```

Script for UnaryProm

```

Function UnaryProm(rw As Long) As Long
Dim i, j, k As Long, count As Long
Dim hold As String
hold = Cells(Abs(rw), OutputCol).Value

For i = Len(hold) To 1 Step -1
  If k = 492 Then
    Exit For
  ElseIf Mid(hold, i, 1) = ")" Or Mid(hold, i, 1) = "]" Then
    For j = i To 1 Step -1
      If Mid(hold, j, 1) = "x" Or Mid(hold, j, 1) = "f" Then
        count = count + 1
      ElseIf Mid(hold, j, 1) = "(" Or Mid(hold, j, 1) = "[" Then
        k = 492
      End If
    Next
  End If
Next
End If
UnaryProm = count - 1
End Function

```

Appendix C

Prosodic Effects on Sentential Prominence

This appendix explores prosodic variations of the data presented in the paper. The data in the paper used only monosyllabic stems. This appendix tests what happens when different kinds of prosodic stems are used. It is assumed that the prominent word will remain prominent regardless of its prosody, and therefore this word is held constant. The non-prominent lexical words are potential sites for prominence if prosody has some say on where the main prominence can be seen. This appendix therefore only varies the prosody on these non-prominent words, to test whether there is a prosodic effect. A search for appropriate verbs was conducted using Levin (1993) as a resource. Data are organized by construction and then by prosodic pattern, where “S” denotes the prominent syllable and “W” denotes non-prominent syllables.

1. Unergatives – Varying Subject Prosody

Conclusion: No Prosodic Effects

(1) S

- a. Bill RAN
- b. # BILL ran
- c. The boy RAN
- d. # The BOY ran

(2) SW

- a. Jamie RAN
- b. # JAMIE ran
- c. The farmer RAN
- d. # The FARMER ran

(3) WS

- a. Lorraine RAN
- b. # LORRAINE ran
- c. The chauffeur RAN
- d. # The CHAUFFEUR ran

(4) SWW

- a. Benjamin RAN
- b. # BENJAMIN ran
- c. The manager RAN
- d. # The MANAGER ran

(5) WSW

- a. Felicia RAN
- b. # FELICIA ran
- c. The policeman RAN
- d. # The POLICEMAN ran

(6) WWS

- a. Dominique RAN
- b. # DOMINIQUE ran
- c. The connoisseur RAN
- d. # The CONNOISSEUR ran

(7) WSWW

- a. Elizabeth RAN
- b. # ELIZABETH ran
- c. The psychiatrist RAN
- d. # The PSYCHIATRIST ran

(8) WWSW

- a. Alexander RAN
- b. # ALEXANDER ran
- c. The mathematician RAN
- d. # The MATHEMATICIAN ran

(9) WWSWW

- a. The anthropologist RAN
- b. # The ANTHROPOLOGIST ran

2. Passives – Varying Verb Prosody

Conclusion: Possible effect from the prosody of the verb

(10) S

- a. A BALL was kicked
- b. # A ball was KICKED

- (11) SW
 a. A BALL was dribbled⁴²
 b. # A ball was DRIBBLED
- (12) WS
 a. A BALL was removed
 b. # A ball was REMOVED
- (13) SWW
 a. A BALL was autographed
 b. # A ball was AUTOGRAPHED
- (14) WSW
 a. A BALL was examined
 b. # A ball was EXAMINED
- (15) WWS
 a. A BALL was dispossessed
 b. #? A ball was DISPOSSESSED
- (16) WSWW
 a. A BALL was identified
 b. # A ball was IDENTIFIED
- (17) WWSW
 a. A BALL was manufactured
 b. #? A ball was MANUFACTURED
- (18) SWWW
 a. A BALL was visualized
 b. # A ball was VISUALIZED

3. Restrictive Relative Clauses – A. Varying Prosody in the Verb inside the Relative Clause

Conclusion: No prosodic effect

- (19) S
 a. I like the book that Bill gave JOHN
 b. # I like the book that Bill GAVE John

⁴² These facts are the same for bare plural forms of the DP. However, these facts are different when using the definite determiner: The (b) examples seem equally felicitous as the (a) examples in this case. This might be due to an effect where definite DP's is more easily focused.

- (20) SW
 a. I like the book that Bill promised JOHN
 b. # I like the book that Bill PROMISED John
- (21) WS
 a. I like the book that Bill assigned JOHN
 b. # I like the book that Bill ASSIGNED John
- (22) SWW(W)⁴³
 a. I like the book that Bill allocated JOHN
 b. # I like the book that Bill ALLOCATED John
- (23) WSW(W)⁴⁴
 a. I like the book that Bill relinquished to JOHN
 b. # I like the book that Bill RELINQUISHED to John
- (24) WWS
 a. I like the book that Bill guaranteed JOHN
 b. # I like the book that Bill GUARANTEED John
- (25) WSWW⁴⁵
 a. I like the test that Bill administered for JOHN
 b. # I like the test that Bill ADMINISTERED for John
- (26) WWSW
 No verbs available
- (27) SWWW
 No verbs available

3B. Varying Prosody only in the Head of the RC

Conclusion: No effect seen

- (28) S
 a. I like the book that Bill gave JOHN
 b. # I like the BOOK that Bill gave John

- (29) SW

⁴³ Generally, verbs that require [ə]-insertion in their past tense form are avoided. In this case, the only SWW verb in Levin (1993) that is grammatical for this sentence is “allocate”. This verb requires the insertion of [ə] in past tense.

⁴⁴ No WSW verbs were available that did not require a preposition.

⁴⁵ “administer” is the only verb available here. It requires a preposition and a different subject.

- a. I like the novel that Bill gave JOHN
- b. # I like the NOVEL that Bill gave John

(30) WS

- a. I like the report that Bill gave JOHN
- b. # I like the REPORT that Bill gave John

(31) SWW(W)

- a. I like the paperback that Bill gave JOHN
- b. # I like the PAPERBACK that Bill gave John

(32) WSW(W)

- a. I like the apartment that Bill gave JOHN
- b. # I like the APARTMENT that Bill gave John

(33) WWS

- a. I like the souvenir that Bill gave JOHN
- b. # I like the SOUVENIR that Bill gave John

(34) WSWW

- a. I like the analysis that Bill gave JOHN
- b. # I like the ANALYSIS that Bill gave John

(35) WWSW

- a. I like the publication that Bill gave JOHN
- b. # I like the PUBLICATION that Bill gave John

(36) SWWW

- a. I like the dictionary that Bill gave JOHN
- b. # I like the DICTIONARY that Bill gave John

4. Unaccusatives – Varying Prosody on the Verb

Conclusion: Verb is prominent when 4-syllables long and when it is trisyllabic and stress-initial.

(37) S

- a. The ICE broke
- b. # The ice BROKE

(38) SW

- a. ? The ICE shattered
- b. ? The ice SHATTERED

(39) WS

- a. ? The ICE submerged

- b. ? The ice SUBMERGED
- (40) SWW (verb prominent)
 - a. The ice CRYSTALLIZED
 - b. # The ICE crystallized
- (41) WSW
 - a. ? The ICE diminished
 - b. ? The ice DIMINISHED
- (42) WWS⁴⁶
 - a. The TIN decomposed
 - b. # The tin DECOMPOSED
- (43) WSWW (verb prominent)
 - a. # The ICE emulsified
 - b. The ice EMULSIFIED
- (44) WWSWW⁴⁷ (Verb prominent)
 - a. # The ROOM dehumidified
 - b. The room DEHUMIDIFIED
- (45) SWWW (Verb prominent)
 - a. # The ICE volatilized
 - b. The ice VOLATILIZED

5. Wh-Movement from Object Position – A. Varying Prosody on the Verb

Conclusion: Quadrisyllabic verbs are prominent; wh-phrases are prominent if the verb is one or two syllables. Judgements are less clear with trisyllabic verbs.

- (46) S
 - a. What BOOK did Bill read?
 - b. # What book did Bill READ?
- (47) SW
 - a. What BOOK did Bill study?
 - b. # What book did Bill STUDY?
- (48) WS
 - a. What BOOK did Bill observe?
 - b. # What book did Bill OBSERVE?

⁴⁶ No verb is available here that can take “ice” as an argument.

⁴⁷ No WWSW verbs available; this single WWSWW verb is available, but not with “ice” as an argument.

- (49) SWW
 a. What BOOK did Bill memorize?
 b. #? What book did Bill MEMORIZE?
- (50) WSW
 a. ? What BOOK did Bill admonish?
 b. ? What book did Bill ADMONISH?
- (51) WWS
 a. ? What BOOK did Bill recommend?
 b. ? What book did Bill RECOMMEND?
- (52) WSWW (verb prominent)
 a. # What BOOK did Bill identify?
 b. What book did Bill IDENTIFY?
- (53) WWSW (verb prominent)
 a. # What BOOK did Bill discontinue?⁴⁸
 b. What book did Bill DISCONTINUE?
- (54) SWWW (verb prominent)
 a. # What BOOK did Bill photocopy
 b. What book did Bill PHOTOCOPY

5B. Varying Prosody on the Wh-Phrase

This section is included as a control for the next section, where subject and verb are simultaneously varied prosodically.

Conclusion: No prosodic effect, as expected.

- (55) S
 a. What BOOK did Bill read?
 b. # What book did Bill READ?
 c. # What book did BILL read?
- (56) SW
 a. What NOVEL did Bill read?
 b. # What novel did Bill READ?
 c. # What novel did BILL read?
- (57) WS
 a. What REPORT did Bill read?

⁴⁸ This is felicitous in a context where Bill is the head of a publishing company.

- b. # What report did Bill READ?
- c. # What report did BILL read?

(58) SWW

- a. What PAPERBACK did Bill read?
- b. # What paperback did Bill READ?
- c. # What paperback did BILL read?

(59) WSW

- a. What ANNOUNCEMENT did Bill read?
- b. # What announcement did Bill READ?
- c. # What announcement did BILL read?

(60) WWS⁴⁹

- a. What MAGAZINE did Bill read?
- b. # What magazine did Bill READ?
- c. # What magazine did BILL read?

(61) WSWW

- a. What ANALYSIS did Bill read?
- b. # What analysis did Bill READ?
- c. # What analysis did BILL read?

(62) WWSW

- a. What PROCLAMATION did Bill read?
- b. # What proclamation did Bill READ?
- c. # What proclamation did BILL read?

(63) SWWW

None

5C. Varying Prosody on three-syllable Subjects and three-syllable Verbs

Conclusion: Prominence tends to be equally good on the wh-phrase and the verb, with a slight bias for prominence on the verb in two examples below.

(64) SWW Subject, SWW Verb

- a. ? What PAPERBACK did Bill memorize?
- b. ? What paperback did Bill MEMORIZE?

(65) SWW Subject, WSW Verb

- a. ? What PAPERBACK did Bill admonish?
- b. ? What paperback did Bill ADMONISH?

⁴⁹ “Magazine” is optionally pronounced as SWW. However, due to the lack of readable WWS objects, I use it here with the intended WWS reading.

- (66) SWW Subject, WWS Verb
 a. ? What PAPERBACK did Bill recommend?
 b. ? What paperback did Bill RECOMMEND?
- (67) WSW Subject, SWW Verb
 a. ? What ANNOUNCEMENT did Bill memorize?
 b. ? What announcement did Bill MEMORIZE?
- (68) WSW Subject, WSW Verb (Verb prominent?)
 a. #? What ANNOUNCEMENT did Bill admonish?
 b. What announcement did Bill ADMONISH?
- (69) WSW Subject, WWS Verb (Verb prominent?)
 a. #? What ANNOUNCEMENT did Bill recommend?
 b. What announcement did Bill RECOMMEND?
- (70) WWS Subject, SWW Verb
 a. ? What MAGAZINE did Bill memorize?
 b. ? What magazine did Bill MEMORIZE?
- (71) WWS Subject, WSW Verb
 a. ? What MAGAZINE did Bill admonish?
 b. ? What magazine did Bill ADMONISH?
- (72) WWS Subject, WWS Verb
 a. ? What MAGAZINE did Bill recommend?
 b. ? What magazine did Bill RECOMMEND?

6. Adverbs Preceding the Verb – Varying Prosody on the Adverb

Conclusion: No effect

- (73) SW
 a. The ice loudly BROKE
 b. # The ICE loudly broke
 c. # The ice LOUDLY broke
- (74) SWW
 a. The ice suddenly BROKE
 b. #? The ICE suddenly broke
 c. # The ice SUDDENLY broke
- (75) SWWW
 a. The ice innocently BROKE
 b. # The ICE innocently broke

c. # The ice INNOCENTLY broke

(76) WSWW

- a. The ice dramatically BROKE
- b. # The ICE dramatically broke
- c. # The ice DRAMATICALLY broke

(77) WWSWW

- a. The ice unexpectedly BROKE
- b. # The ICE unexpectedly broke
- c. # The ice UNEXPECTEDLY broke

(78) WSWWW

- a. The ice mysteriously BROKE
- b. # The ICE mysteriously broke
- c. # The ice MYSTERIOUSLY broke

7. Adverbs Following the Verb – Varying Prosody on the Verb

Conclusion: No effect

(79) S

- a. The ice broke LOUDLY
- b. # The ICE broke loudly
- c. # The ice BROKE loudly

(80) SW

- a. The ice shattered LOUDLY
- b. # The ICE shattered loudly
- c. # The ice SHATTERED loudly

(81) WS

- a. The ice submerged QUICKLY
- b. # The ICE submerged quickly
- c. # The ice SUBMERGED quickly

(82) SWW

- a. The ice crystallized QUICKLY
- b. # The ICE crystallized quickly
- c. # The ice CRYSTALLIZED quickly

(83) WSW

- a. The ice diminished QUICKLY
- b. # The ICE diminished quickly
- c. # The ice DIMINISHED quickly

(84) WWS

- a. The tin decomposed QUICKLY
- b. # The TIN decomposed quickly
- c. # The tin DECOMPOSED quickly

(85) WSWW

- a. The ice emulsified QUICKLY
- b. # The ICE emulsified quickly
- c. # The ice EMULSIFIED quickly

(86) WWSWW

- a. The room dehumidified QUICKLY
- b. # The ROOM dehumidified quickly
- c. # The room DEHUMIDIFIED quickly

(87) SWWW

- a. The ice volatilized quickly
- b. # The ICE volatilized quickly
- c. # The ice VOLATILIZED quickly