Variation in Optimality Theory, IU Phonology Fest, 19-22 June, 2006 *Handout #4*
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PHONOLOGICAL VARIATION AND ENGLISH WORD ORDER

1. Introduction

(1) Does phonology influence the ordering of meaningful elements?

(2) (a) She was recommending [me] [designs] and I gladly listened.
(b) Man gave [names] [to all the animals].
(c) A staff sergeant is explaining [to the men] [the rules of the Geneva Convention].

(3) Three observations suggest that phonology plays some role here:
- Unstressed pronouns behave differently from other NPs (*me* vs. *designs*)
- The foot structure of the verb matters (*gíve* vs. *èxpláin*)
- The "weight" of the NP matters (*the men* vs. *the rules of the Geneva Convention*).

(4) How to study this? The data are highly variable and gradient, so we need
- a phonologically annotated corpus of English
- a phonological model that predicts, for each input, what the possible orderings are as well as the quantitative preferences among them

2. Empirical generalizations

2.1 The unstressed pronoun generalization

(5) <u>Generalization 1</u>: Lexically unstressed pronouns have special ordering properties.

(6) <u>Themes</u>: Unstressed pronoun themes have a narrower distribution than other NPs:
(a) John gave <u>food</u> to Peter ~ John gave Peter <u>food</u>.
(b) John gave <u>it</u> to Peter / *John gave Peter <u>it</u>.

(7) <u>Goals</u>: Unstressed pronoun goals have a wider distribution than other NPs (Bresnan and Nikitina 2003, henceforth B&N, Grimshaw 2005):
(a) Verbs of continuous imparting of force:
*I lowered <u>John</u> the box.
Buddha lowered <u>him</u> the silver thread of a spider. (B&N)
(b) Verbs of manner of speaking:
*Susan muttered <u>Rachel</u> the news.
She muttered <u>him</u> a hurried apology. (B&N)
(c) *donate, return*, and the like:
*John donated <u>the charity</u> money.
They can get the gullible ones to donate <u>them</u> money. (Google)
*John returned <u>the government</u> the money.
Judas returned <u>them</u> the money (Google).

(8) <u>Proposal</u>: Unary prosodic constituents must contain at least one lexical stress.

*John gave Peter [it].	lexically unstressed, unary.
John gave it [to him].	lexically unstressed, binary
John gave Peter [fóod].	lexically stressed, unary
John gave Peter [some fóod].	lexically stressed, binary

(9) How about the goal pattern (*Judas returned them the money*)? Stay tuned.

2.2 The NP weight generalization

(10) <u>Generalization 2</u>: "Heavy" constituents come last.

(11) <u>Proposal</u>: Phrasal stress attracts lexical stress:

- Sentence stress falls on the rightmost constituent (The Nuclear Stress Rule).
- Word stress and sentence stress preferably coincide.

(12) <u>The Nuclear Stress Rule</u> (Chomsky and Halle 1968): The most prominent syllable of the rightmost constituent in a phrase P is the most prominent syllable of P.

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                                    x
                        x           x
            x           x       x   x
Example:    ((volunteer firemen) (save lives))
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(13) <u>The Stress-to-Stress Principle</u>: Word stress implies phrasal stress (WS ⊃ PS) (gradient).

	WS ⊃ PS
x x x x a. Robertson gave [critical backing] [to <u>Bush</u>]	**!
x x x x b. → Robertson gave [Bush] [critical <u>backing</u>]	*

(14) The constraint WS ⊃ PS has the effect of maximizing the number of lexical stresses in the constituent under sentence stress.

(15) <u>Prediction 1</u>: Only the <u>relative weight</u> of the arguments should matter (Wasow 2002):

(a) Goal < Theme: *gave* (*my síster*) (*twénty dóllars*)
(b) Goal > Theme: *gave* (*the móney*) (*to my líttle síster*)
(c) Goal = Theme: *gave* (*my síster*) (*the móney*) ~ *gave* (*the móney*) (*to my síster*)

(16) Another possibility (Jäger and Rosenbach 2004): length effects are additive

(a) *verb [wórd]*$_{Go}$ *[wórd wórd]*$_{Th}$ Theme prefers the right edge.
(b) *verb [wórd]*$_{Go}$ *[wórd wórd wórd]*$_{Th}$ Theme prefers the right edge even more.

(17) Prediction 2: The weight effect should disappear if nuclear stress is lured away:

(a)	Robertson gave [critical backing] [to Bush] last year	
(b)	not to give [children] [it] to avoid possible allergies	(B&N 2003:19-20)
(c)	never send [someone] [them] in the mail either	(B&N 2003:19-20)
(d)	showing [people] [him] through our life	(B&N 2003:19-20)

(18) Prediction 3: Function words (*a/an, the, of,…*) should not count for weight. Compare this to "syntactic weight" where the number of syntactic nodes matters (see Wasow 2002).

(19) Do both primary and secondary stresses matter? At this point, I have no idea (but see Cohan, Kager, Quené, and Nooteboom 2001, for evidence from Dutch.)

2.3 The verb length generalization

(20) Generalization 3: Dative alternation is restricted to verbs dominated by a single foot (Fraser 1998, Grimshaw 2005).

(21) (a) They (gave) the church money
(b) *They (do)(nated) the church money.

(22) Some alternating verbs:

a(ccord)	(bring)	(lend)	(phone)	(cable)
ad(vance)	(give)	(loan)	(send)	(forward)
a(llot)	(grant)	(mail)	(show)	(offer)
a(llow)	(hand)	(owe)	(teach)	(promise)
a(ssign)	(lease)	(pass)	(tell)	(signal)
a(ward)	(leave)	(pay)	(write)	(xerox)

(23) The verbs in the leftmost column appear to have an initial extrametrical vowel, witness reduction. (See Downing 1998 for the prosodic misalignment of onsetless syllables.)

(24) Some non-alternating verbs (Levin 1993):

(con)(vey)	(ex)(plain)
(de)(liver)	(pre)(sent)
(dic)(tate)	(re)(mit)
(do)(nate)	(re)(turn)
(en)(trust)	(trans)(fer)

(25) A minor pattern: The following verbs are dipodic, yet they alternate to some extent:

(allo)(cate)	(reco)(mmend)
(cata)(pult)	(sate)(llite)
(conse)(crate)	(sema)(phore)
(guaran)(tee)	(tele)(cast)
(nomi)(nate)	(tele)(graph)
(radi)(o)	(tele)(phone)

(26) (a) A semantic generalization (Green 1974, Gropen et al. 1989, Krifka 1999): Verbs which describe transfer by modern technology, e.g. *satellite, telegraph, telephone* allow double objects regardless of prosodic structure.

(b) A phonological generalization (Fraser 1998): "I have no explanation, but note that they are all initially stressed". In addition, all start with a disyllabic foot.

(27) Why should the number of feet matter?

- A verb and its complement form a prosodic phrase (Inkelas and Zec 1995).
- Prosodic constituents are preferably binary.

(28)	(a)	[(give) (my sister)] [the book]	binary phrase
	(b)	*[(re)(turn) (my sister)] [the book]	ternary phrase

(29) Prediction 1: Unstressed pronouns should be preferred in double object constructions:

	(a)	*John [retúrned the góvernment] [the money].	stress clash
	(b)	Judas [retúrned them] [the money].	no stress clash

(30) With war still looming in Iraq and Santa having to deliver presents to every good child in the world by 24 hrs, I wonder if this year his sleigh will get shot down by a SAM (Surface-to-Air Missile) when he's delivering them presents over Iraq. (Google)

(31) Prediction 2: Only the number of feet should matter. Thus, *donate* and *donated* are correctly predicted to show the same alternation pattern (Fraser 1998).

(32) Perhaps only Level I stress matters: *rebring, regive, rehand, relend*, where *re-* is the Level II prefix 'do again', are alternating (Fraser 1998).

(33) Complication: The analysis crucially assumes that the double object construction and the prepositional construction have different phonological phrasings:

	(a)	*[(do)(nate) (my sister)] [the money]	a ternary constituent
	(b)	[(do)(nate)][the money][to my sister]	no ternary constituents

(34) Solution: PARSE(Goal): The goal NP must be parsed together with its syntactic head.

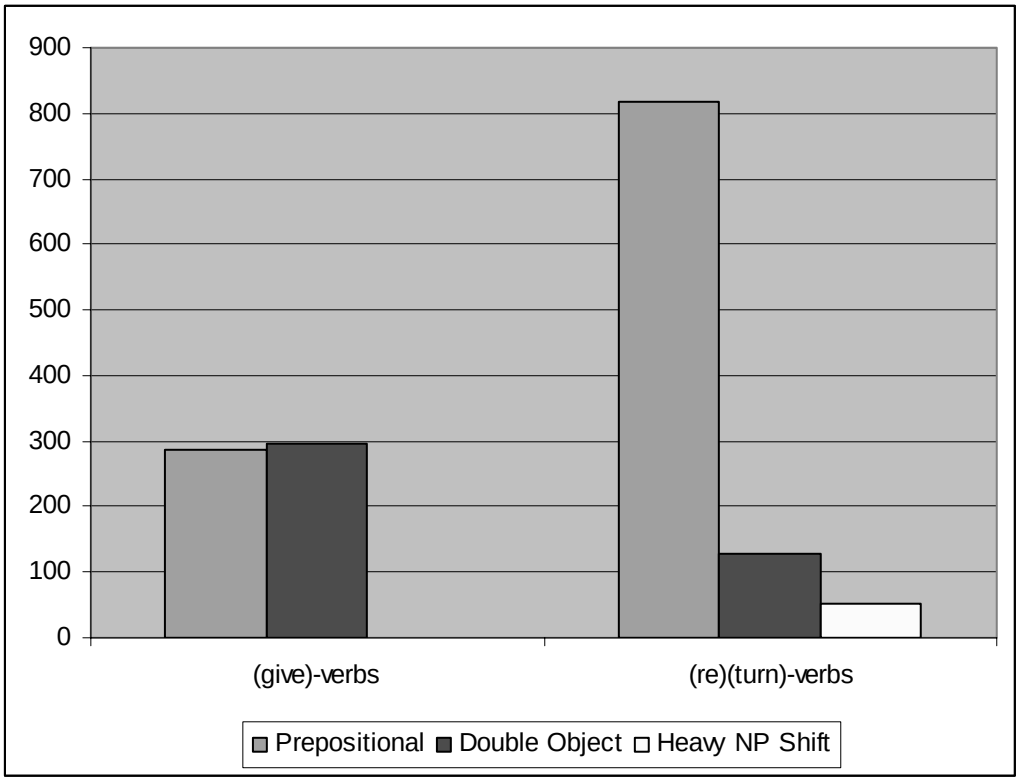
	(a)	[gave my sister]	head = verb
	(b)	[to my sister]	head = preposition

(35) Data from www.blogspot.com (16 verbs, 1,580 sentences):

- One foot verbs: *assign, award, bring, give, offer, promise*
- Two foot verbs: *administer, bequeath, concede, convey, deliver, donate, explain, guarantee, recommend, reveal*

(36) The constructions are not all equally common

CONSTRUCTION	TOKENS	EXAMPLE
Prepositional Construction	1,103	*I returned the book to my little sister.*
Double Object construction	425	*I gave her the book.*
Heavy NP Shift	52	*I returned to her the old book.*



$df = 1$, $X^2 = 251$, $p \leq 0.001$ (Heavy NP Shift omitted)

(37) Heavy NP Shift only occurs with two-foot verbs. Why?

3. The phonological model

(38) (a) Input space: 8 possible types of VPs
(b) Output space: 4 orderings, 2 phonological phrasings

VERB	GOAL	THEME	OUTPUT CANDIDATES		
φ	stressed	stressed	(*give*) (*the book*) (*to my sister*)	3 phrases	preposition
			(*give*) (*to my sister*) (*the book*)	3 phrases	heavy NP shift
			(*give*) (*the book*) (*my sister*)	3 phrases	??
			(*give*) (*my sister*) (*the book*)	3 phrases	double object
			(*give the book*) (*to my sister*)	2 phrases	preposition
			(*give to my sister*) (*the book*)	2 phrases	heavy NP shift
			(*give the book*) (*my sister*)	2 phrases	??
			(*give my sister*) (*the book*)	2-phrases	double object
φ	stressed	--	(*give*) (*it*) (*to my sister*)	etc.	
φ	--	stressed	(*give*) (*the book*) (*to her*)		
φ	--	--	(*give*) (*it*) (*to her*)		
φ+	stressed	stressed	(*return*)(*the book*) (*to my sister*)		
φ+	stressed	--	(*return*)(*it*)(*to my sister*)		
φ+	--	stressed	(*return*)(*the book*)(*to her*)		
φ+	--	--	(*return*) (*it*)(*to her*)		

(39) Undominated constraints (for most dialects of English):
(a) PARSE(Goal) Goal NP must be parsed together with its head.
(b) *(x) Avoid lexically unstressed unary constituents.

(40) Dominated constraints:
*TERNARY No ternary prosodic phrases.
*CLASH No stress clashes within a prosodic phrase.
WS ⊃ PS Word stress implies phrasal stress.
*PHRASE No prosodic phrases (gradiently evaluated).
FOCUS(Go) Focus goal, i.e. put the goal NP under phrasal stress.
FOCUS(Th) Focus theme, i.e. put the theme NP under phrasal stress.
*to No preposition.

(41) The tableau for the input '*give*(*my sister, the book*)'. Four possible winners (a, b, e, h).

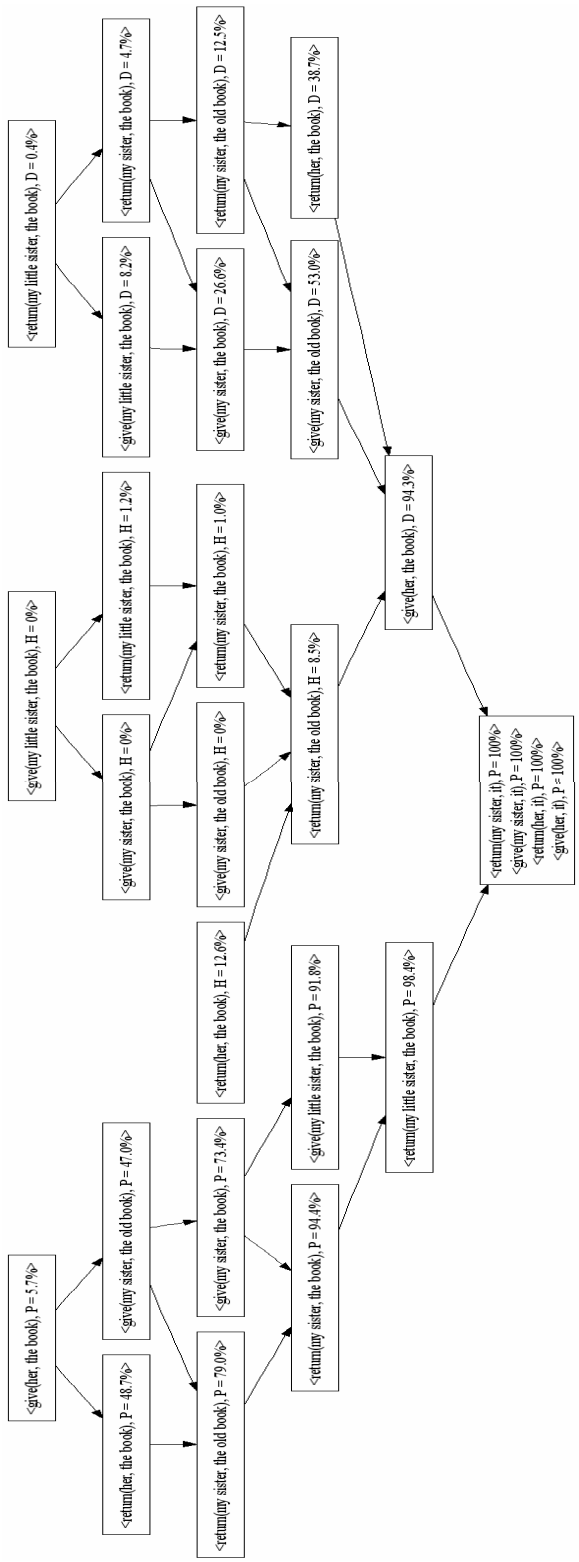
	PAR(Go)	*(x)	*TERN	*CLA	F(Th)	F(Go)	WS⊃PS	*to	*PHR
a. **(give)(the book)(to my sister)**					*		*	*	***
b. **(give)(to my sister)(the book)**						*	*	*	***
c. (give)(the book)(my sister)	*!				*		*		***
d. (give)(my sister)(the book)	*!					*	*		***
e. **(give the book)(to my sister)**				*	*		*	*	**
f. (give to my sister)(the book)				*		*	*	*	**
g. (give the book)(my sister)	*!			*	*		*		**
h. **(give my sister)(the book)**				*		*	*		**

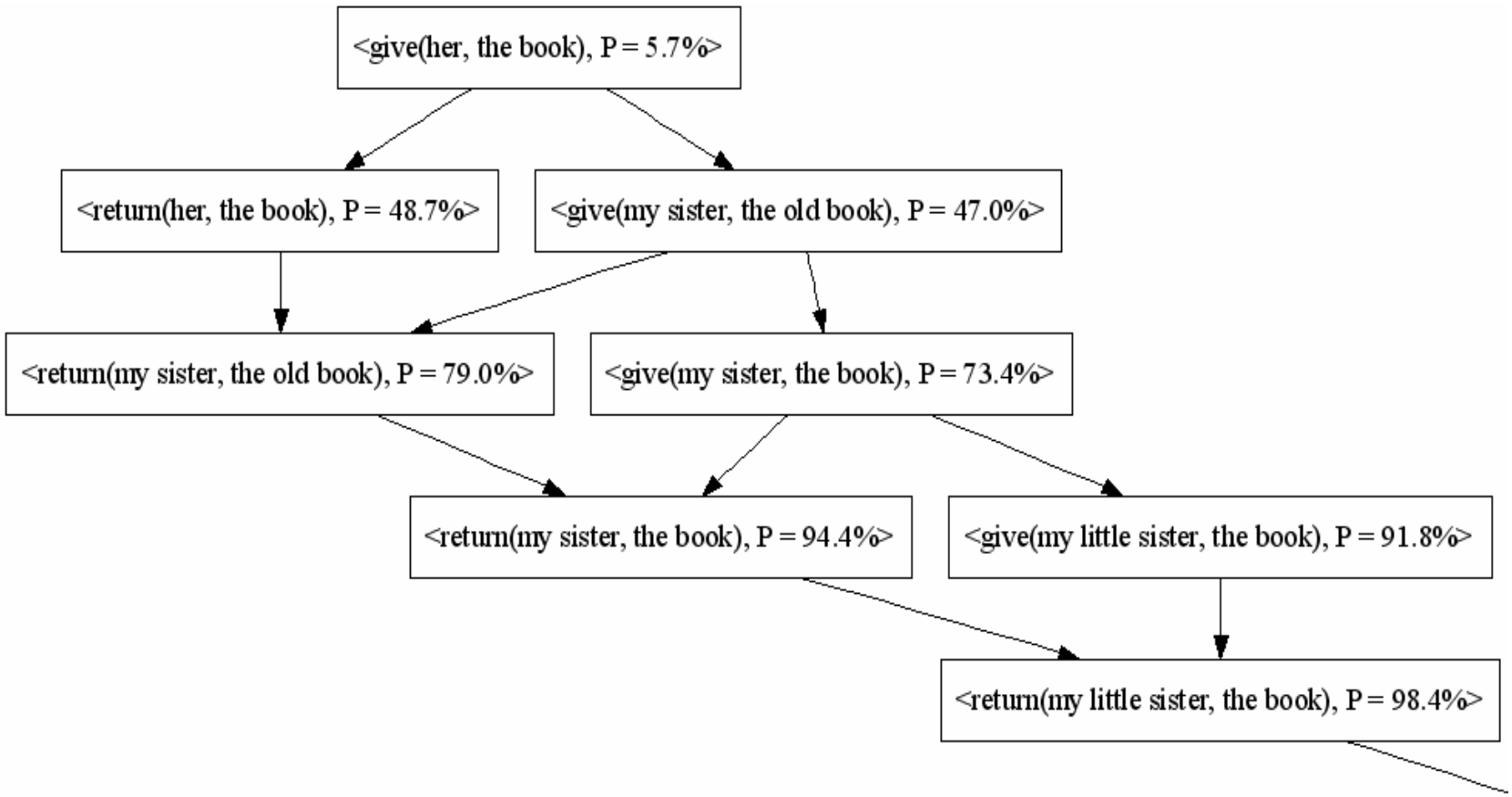
(42) The tableau for the input '*give*(*my sister, it*)'. One possible winner (e).

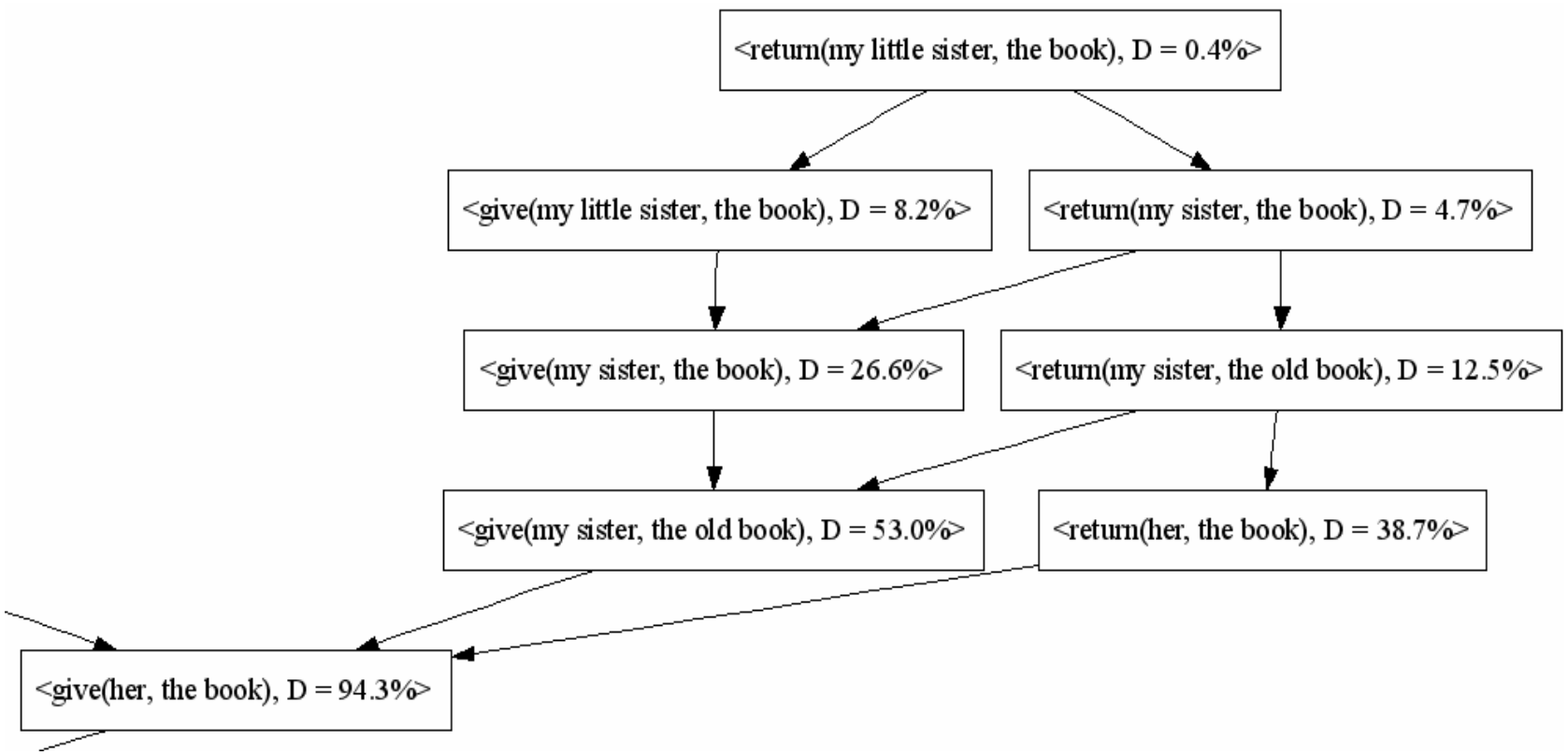
	PAR(Go)	*(x)	* TERN	*CLA	F(Th)	F(Go)	WS⊃PS	*to	*PHR
a. (give)(it)(to my sister)		*!			*			*	***
b. (give)(to my sister)(it)		*!				*	*	*	***
c. (give)(it)(my sister)	*!	*			*				***
d. (give)(my sister)(it)	*!	*				*	*		***
e. **(give it)(to my sister)**					*			*	**
f. (give to my sister)(it)		*!		*		*	*	*	**
g. (give it)(my sister)	*!				*				**
h. (give my sister)(it)		*!		*		*	*		**

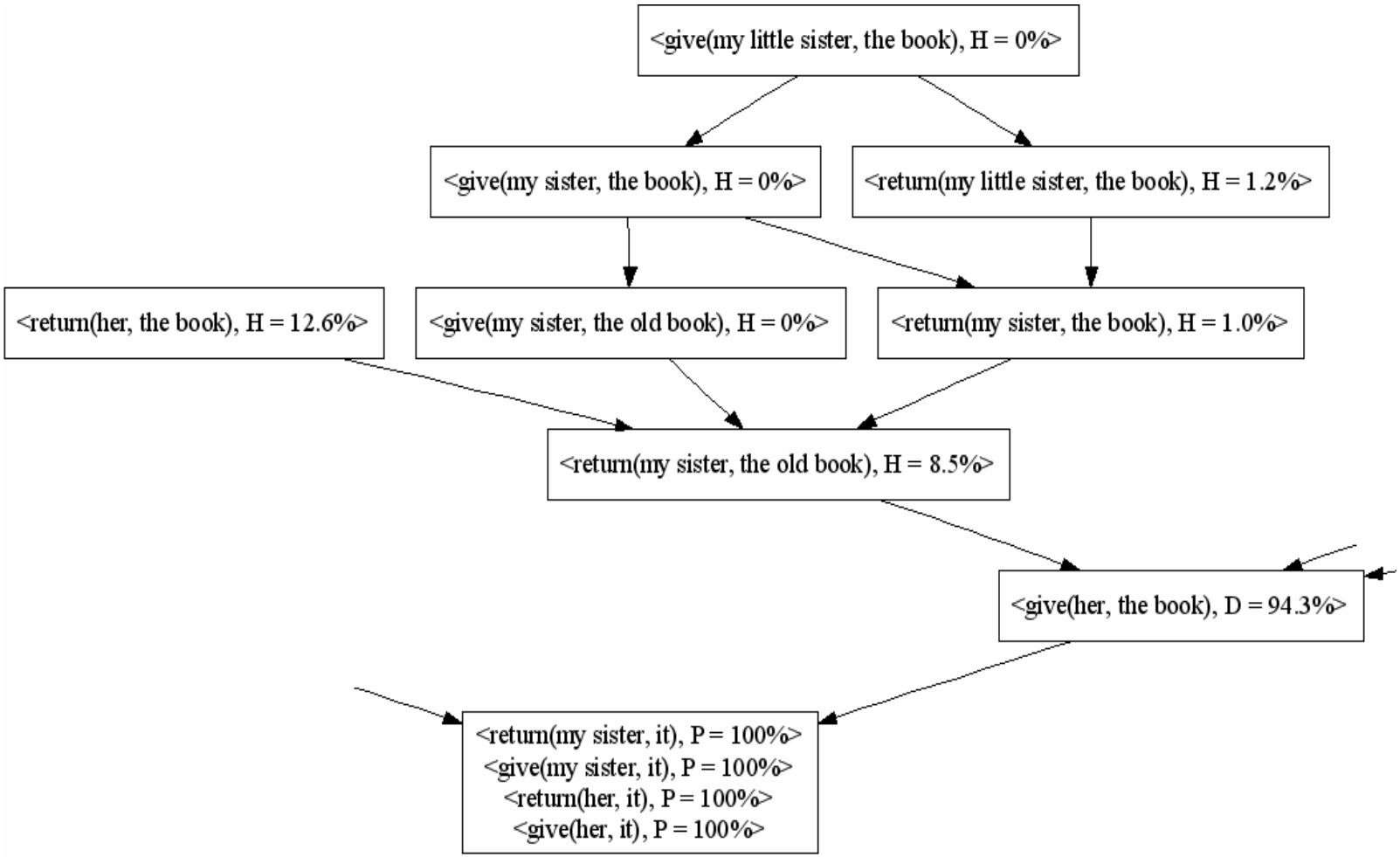
(43)	INPUT	DOUBLE OBJECT	PREPOSITION	HNPS
1.	/give(my sister, the book)/:	**yes**	**yes**	**yes**
2.	/return(my sister, the book)/:	**yes**	**yes**	**yes**
3.	/give(her, it)/:	--	**yes**	--
4.	/return(her, it)/:	--	**yes**	--
5.	/give(her, the book)/:	**yes**	**yes**	**yes**
6.	/return(her, the book)/:	**yes**	**yes**	**yes**
7.	/give(my sister, it)/:	--	**yes**	--
8.	/return(my sister, it)/:	--	**yes**	--
9.	/give(my sister, the old book)/:	**yes**	**yes**	**yes**
10.	/return(my sister, the old book)/:	**yes**	**yes**	**yes**
11.	/give(my little sister, the book)/:	**yes**	**yes**	**yes**
12.	/return(my little sister, the book)/:	**yes**	**yes**	**yes**

(44) t-order for English dative constructions




<give(her, the book), P = 5.7%>
<return(her, the book), P = 48.7%>
<give(my sister, the old book), P = 47.0%>
<return(my sister, the old book), P = 79.0%>
<give(my sister, the book), P = 73.4%>
<return(my sister, the book), P = 94.4%>
<give(my little sister, the book), P = 91.8%>
<return(my little sister, the book), P = 98.4%>


<return(my little sister, the book), D = 0.4%>
<give(my little sister, the book), D = 8.2%>
<return(my sister, the book), D = 4.7%>
<give(my sister, the book), D = 26.6%>
<return(my sister, the old book), D = 12.5%>
<give(my sister, the old book), D = 53.0%>
<return(her, the book), D = 38.7%>
<give(her, the book), D = 94.3%>


<give(my little sister, the book), H = 0%>
<give(my sister, the book), H = 0%>
<return(my little sister, the book), H = 1.2%>
<return(her, the book), H = 12.6%>
<give(my sister, the old book), H = 0%>
<return(my sister, the book), H = 1.0%>
<return(my sister, the old book), H = 8.5%>
<give(her, the book), D = 94.3%>
<return(my sister, it), P = 100%>
<give(my sister, it), P = 100%>
<return(her, it), P = 100%>
<give(her, it), P = 100%>

4. Two predictions

4.1 HNPS and verb length

(45) Prediction: Long verbs are predicted to exhibit more Heavy NP Shift than short verbs.

(46) Heavy NP Shift in the blogspot corpus:

		blogspot
(a)	**return [to her] [the book]**	**N = 31**
	return [to my sister][the old book]	**N = 17**
	return [to my little sister] [the book]	**N = 3**
	return [to my sister][the book]	**N = 2**
(b)	give [to her][the book]	N = 0
	give [to my sister] [the old book]	N = 0
	give [to my little sister][the book]	N = 0
	give [to my sister] [the book]	N = 0

(47) What is the intuition behind this prediction?

(48) With two-foot verbs, *TERNARITY favors Heavy NP Shift.

(a)	??(*revealed him*)(*the truth*)	Dative Shift dispreferred
(b)	(*revealed*)(*to him*)(*the truth*)	Heavy NP Shift preferred

	*TERNARITY	*PHRASE	*to
→ a. [(re)(veal)] [to him] [the truth]		***	*
→ b. [(re)(veal)(him)] [(the truth)]	*	**	

(49) With one-foot verbs, Heavy NP Shift is unnecessarily complicated.

(a)	(*give her*)(*the book*)	Dative Shift preferred
(b)	??(*give*)(*to her*)(*the book*)	Heavy NP Shift dispreferred

	*TERNARITY	*PHRASE	* to
a. #[(give)] [to her] [the book]		***	*
→ b. [(give)(her)] [the book]		**	

(50) The comparative nature of well-formedness: The well-formedness of an expression depends on the well-formedness of alternative expressions for the same meaning.

4.2 Pronoun sequences

(51) B&N observe the following typological asymmetry:

DIALECT 1	DIALECT 2	DIALECT 3
I gave her it	**I gave her it*	**I gave her it*
**I gave my sister it*	**I gave my sister it*	*I gave my sister it*
(Hawkins 1994:312)	(Erteschik-Shir 1979:452)	no such dialect

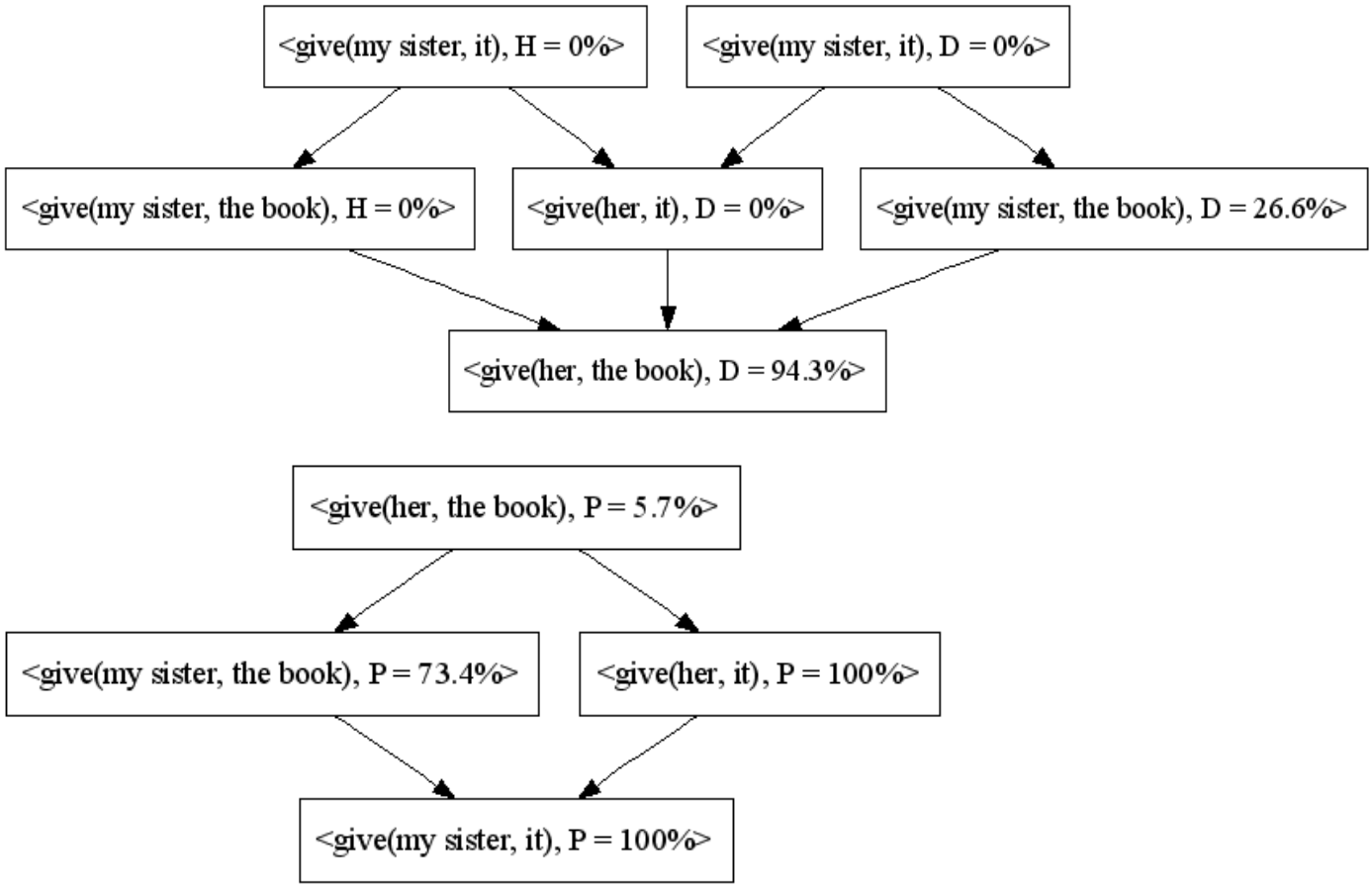
(52) B&N's analysis:

(a) *NP PRON — Personal pronouns are avoided when following lexical NPs.
*XP PRON — Personal pronouns are avoided when following any NP.
*STRUCT — Avoid PP

(b) Paninian ranking *NP PRON >> *XP PRON

(c) *NP PRON >> *XP PRON >> *STRUCT — Erteschik-Shir
*NP PRON >> *STRUCT >> *XP PRON — Hawkins

(53) This is predicted by the prosodic analysis. In Hawkins' dialect, *(x) 'Avoid lexically unstressed unary constituents' is dominated. The resulting t-order has two disjoint graphs.



(54) The reason is *CLASH:

- *I* (*gáve my síster*) (*it*) *CLASH violation
- *I* (*gáve her*) (*it*) --

(55) But the prosodic analysis goes further: it predicts a parallel grammaticality contrast between *I gave her the book* > *I gave my sister the book*. This emerges quantitatively in the blogspot data:

- *I* (*gáve my síster*) *the book* *CLASH violation 26.6%
- *I* (*gáve her*) *the book* -- 94.3%

5. Beyond the dative alternation

(56) The Verb-Particle construction:

(a) *it slows the machine down* ~ *it slows down the machine*
(b) *it slows me down* **it slows down me*

(57) Ternarity avoidance: verbs longer than one foot do not combine with particles at all.

(a) *I called him up.* **I telephoned him up*.
(b) *I offered it up*. **I presented it up*.
(c) *I gave it up*. **I donated it up.*

(58) The possessive construction (cf. Anttila and Fong 2004):

(a) *the cat* (*of my síster*) lexically stressed complement
(b) *the cat* (*of míne*) lexically stressed complement
(c) **the cat* (*of me*) lexically unstressed complement

6. Conclusions

- Prosody plays an active role in constituent linearization in English.
- The prosodic effects are mostly gradient and variable, yet absolutely systematic.

Appendix

(59) A summary of the data extracted from www.blogspot.com, reported as absolute numbers. [Preliminary counts which need to be double-checked.]

	INPUT	D	H	P	TOTAL
1.	give(her, the book)	182	--	11	193
2.	give(my sister, the old book)	79	--	70	149
3.	return(her, the book)	92	30	116	238
4.	give(her, it)	--	--	1	1
5.	give(my sister, the book)	25	--	69	94
6.	return(my sister, the old book)	25	17	158	200
7.	return(my sister, the book)	10	2	203	215
8.	return(her, it)	--	--	36	36
9.	give(my little sister, the book)	11	--	123	134
10.	return(my little sister, the book)	1	3	243	247
11.	give(my sister, it)	--	--	12	12
12.	return(my sister, it)	--	--	61	61
		425	52	1,103	1,580

(60) Percentages out of the total number of constructions ordered by decreasing frequency of double objects / increasing frequency of prepositional constructions:

	INPUT	D %	H%	P%
1.	give(her, the book)	94.3	--	5.7
2.	give(my sister, the old book)	53.0	--	47.0
3.	return(her, the book)	38.7	12.6	48.7
5.	give(my sister, the book)	26.6	--	73.4
6.	return(my sister, the old book)	12.5	8.5	79.0
9.	give(my little sister, the book)	8.2	--	91.8
7.	return(my sister, the book)	4.7	1.0	94.4
10.	return(my little sister, the book)	0.4	1.2	98.4
8.	return(her, it)	--	--	100
4.	give(her, it)	--	--	100
11.	give(my sister, it)	--	--	100
12.	return(my sister, it)	--	--	100

References

Aissen, Judith. 2003. 'Differential Object Marking: Iconicity vs. Economy', *Natural Language and Linguistic Theory* 21, 435-483.

Anttila, Arto. 1997. 'Deriving variation from grammar', in Hinskens et al., (eds.), *Variation, Change and Phonological Theory*, John Benjamins, Amsterdam / Philadelphia, pp. 35-68.

Bresnan, Joan, and Tatiana Nikitina. 2003. 'On the Gradience of the Dative Alternation', Ms., Stanford University, http://www-lfg.stanford.edu/bresnan/download.html.

Chomsky, Noam, and Morris Halle. 1968. *The Sound Pattern of English*. Harper and Row, New York.

Cinque, Guglielmo. 1993. A null-theory of phrase and compound stress. *Linguistic Inquiry* 24, 239-298.

Cohan, Jocelyn, René Kager, Hugo Quené, and Sieb Nooteboom. 2001. 'Heavy constituent extraposition: experimental evidence for parallel processing', Paper presented at the North East Linguistic Society (NELS) 32nd Annual Meeting, CUNY Graduate Center and New York University.

Downing, Laura. 1998. 'On the prosodic misalignment of onsetless syllables', *Natural Language and Linguistic Theory* 16, 1-52.

Erteschik-Shir, Nomi. 1979. 'Discourse constraints on dative movement', in Talmy Givón, (ed.), *Discourse and Syntax. Syntax and Semantics, Vol. 12*. Academic Press, New York, pp. 441-467.

Fraser, Bruce. 1998. 'A Phonological Constraint on the alternate to-Dative Form', Ms., Boston University.

Green, Georgia. 1974. *Semantics and Syntactic Regularity*. Indiana University Press, Bloomington.

Grimshaw, Jane. 2005. *Words and Structure*, CSLI Publications, Stanford, California, and University of Chicago Press, Chicago.

Gropen, Jess, Steven Pinker, Michelle Hollander, Richard Goldberg, and Ronald Wilson. 1989. 'The learnability and acquisition of the dative alternation in English', *Language* 65, 203-257.

Hawkins, John. *A Performance Theory of Order and Constituency*. Cambridge University Press, Cambridge.

Inkelas, Sharon, and Draga Zec. 1995. 'Syntax-phonology Interface', in John A. Goldsmith, (ed.), *The Handbook of Phonological Theory*, Blackwell, Oxford. pp. 535-549.

Jäger, Gerhard, and Anette Rosenbach. 2004. 'The winner takes it all – almost. Cumulativity in grammatical variation', Ms., University of Bielefeld and University of Düsseldorf.

Kiparsky, Paul. 1993. 'Variable rules', Handout from Rutgers Optimality Workshop 1.

Krifka, Manfred. 1984. 'Fokus, Topik, syntaktische Struktur und semantische Interpretation', Ms., Universität Tübingen.

Krifka, Manfred. 1999. 'Manner in dative alternation', Paper presented at the West Coast Conference on Formal Linguistics 18, Tucson, Arizona.

Kroch, Anthony. 1989. 'Reflexes of grammar in patterns of language change', *Language Variation and Change* 1, 199-244.

Levin, Beth. 1993. *English Verb Classes and Alternations*. The University of Chicago Press, Chicago and London.

Selkirk, Elisabeth. 1995. 'Sentence Prosody: Intonation, Stress, and Phrasing', in John A. Goldsmith, (ed.), *The Handbook of Phonological Theory*, Blackwell, Oxford. pp. 550-569.

Wagner, Michael. 2004. 'Asymmetries in Prosodic Domain Formation', Ms., MIT.

Wasow, Thomas. 2002. *Postverbal Behavior*, CSLI Publications, Stanford, California.

Zwicky, Arnold. 1986. 'The Unaccented Pronoun Constraint in English', in *OSU Working Papers in Linguistics* 32, 100-113.

Zwicky, Arnold, and Geoffrey K. Pullum. 1986. 'Two Spurious Counterexamples to the Principle of Phonology-Free Syntax', in *OSU Working Papers in Linguistics* 32, 92-99.

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