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#### **Title**

Chains as Unfaithful Optima

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## Chains as Unfaithful Optima\*

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### 1. Economy in Optimality Theory

Any piece of linguistic structure can have a “cost” – the set of violations that are assessed against it, and a “benefit” – the set of constraint violations that are eliminated by virtue of its presence and nature. The language pays the price of a violation only where the ranked constraints leave no alternative.

Optimality Theory is a theory of the economy of constraint violation. Can this property of the theory be exploited in our understanding of economy effects in general? Can economy of structure and movement be derived without reference to economy of structure and movement?

Work in OT has made the assumption that economy of movement must be enforced by a constraint which directly imposes a cost on movement. The constraint \*t (“STAY”) from Grimshaw 1997 (used, for example, in the analyses of Ackema and Neeleman 1998, and Legendre, Smolensky and Wilson 1998) does just this, assessing one violation for each trace. Similarly, constraints/principles proposed in the minimalist literature, such as “Procrastinate” (see Chomsky 1993), stipulate economy of movement.

The central idea of this paper is that the choice between filling positions by movement and filling positions with independent material is determined by markedness and faithfulness constraints. There is no “economy of movement” constraint, just economy of movement effects. Economy of movement follows from the theory of what a chain is.<sup>1</sup>

In work on the economy of structure (Grimshaw 2001, 2002) I argued that the architecture of OT, plus two sets of universal syntactic constraints, enforce economy of structure. This instance of economy is *a theorem*. There is no “economy-of-structure” constraint. (See also Gouskova 2003, where the idea is applied to phonological systems.) As I pointed out in the cited works, this line of reasoning encompasses economy of structure, but it is only where the candidates under comparison have different structures that the markedness constraints also entail economy of movement. In the present paper I extend the logic of the argument, with the goal of deriving economy of movement for contrasting candidates which are structurally identical and differ only in whether or not movement has occurred. I aim to show that faithfulness and markedness constraints entail the economy of movement even for structurally identical candidates.

This promises to dissolve “economy” into a complex of epiphenomena resulting from the nature of grammatical theory, rather than a stipulated set of principles or constraints.

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\* Thanks to colleagues who’ve discussed this work with me, especially to attendees of the 4<sup>th</sup> Annual Stuttgart OT Workshop at the University of Potsdam in 2001, and especially Gisbert Fanselow and Alan Prince.

<sup>1</sup> Throughout this paper the topic is non-trivial chains: trivial chains can be faithful and economy of movement is irrelevant for them.

## 2. The Relationship between Economy of Structure and Economy of Movement

The conclusion of Grimshaw (2001, 2002) is that economy of structure is a theorem of OT, with a particular set of structural markedness constraints among the universal grammatical constraints. These constraints, in conjunction with the architecture of the theory, entail that a phrase with fewer elements is preferred over a phrase with more elements, and a structure containing fewer phrases is preferred over a structure with more phrases, other things being equal.

The constraints which guarantee this result are constraints on structure. They are the alignment constraints (ALIGN HEAD LEFT, ALIGN SPEC LEFT, ALIGN COMP LEFT), and the obligatory element constraints (OBLIGATORY HEAD, OBLIGATORY SPECIFIER). Precise statements of the constraints, and discussions of alternatives, are to be found in the cited works. Same-edge alignment constraints disfavor projections with more elements. Informally, this is because there is only one target edge, and only one element can therefore be perfectly aligned. Phrases with more than one element necessarily incur alignment violations, and phrases with more than two elements incur more violations than phrases with two, and so forth. The obligatory element constraints are violated by phrases with missing pieces. Conflict among the alignment constraints, and between them and the obligatory element constraints, imposes a preference for smaller structures over larger. These conflicts guarantee that every phrase violates at least one constraint. Hence the more phrases there are, the more violations there have to be.

The tableau in (1) illustrates how alignment constraints enforce simple structure. The constraints disfavor projections which contain more elements, and in this instance they prefer a projection containing just a specifier and a complement over one which also contains a head. Candidates b. and c. both incur one more HDLFT violation and one more COMPLFT violation than candidate a. This is true regardless of whether the extra head is distinct from the head of its complement, as in b. or is related to the head of its complement through a chain, as in c. (I use the notation “  ” to indicate the absence of an element, here a head. Chains are bold and italicized throughout the paper).

### (1) Presence of a head adds alignment violations in Spec-H-Comp structure

	HDLFT	COMPLFT
a. [Spec [ <u>  </u> [Spec [ H Comp]]]	*	***
b. [Spec [ H [Spec [ H Comp]]]	**	****
c. [Spec [ <i><b>H</b></i> [Spec [ <i><b>H</b></i> Comp]]]	**	****

A preference for the structure in a. with no movement over a structure with movement is entailed by alignment because movement increases the number of Alignment violations incurred by the structure. (Alignment is calculated relative to XP – see Grimshaw 2001, 2002). This pattern is no surprise, as summarized above. Projections containing three elements violate the proposed alignment constraints three times, and those containing two elements violate them once. Comparing a grammatical structure where the higher projection contains three elements and an alternative in which it contains two, or one where the higher projection contains two

elements and the alternative contains only one, must always favor the simpler structure.

However (1) also shows that preference for a structure with no movement is not entailed by alignment for every comparison, since the constraints assess the chain ( $H, H$ ) in candidate c. in exactly the same way as the two independent heads H and H in candidate b. A moved head and the trace of a moved head are exactly like other heads with respect to the Alignment Constraints. This is as we expect in the theory of chains proposed here, and indeed under variants of the copy theory of movement.

The argument just made for heads applies directly to movement/chains involving XP positions. A structure in which a specifier is moved from a lower projection to a higher projection will incur alignment violations which are not incurred if the higher specifier position is empty. The tableau in (2) parallels the one in (1).

(2) Spec-to-Spec Movement of an XP results in additional violation of Alignment Constraints

	HDLFT	COMPLFT
a. [ ___ H [XP H ]]	*	*
b. [XP H [XP H ]]	**	**
c. [XP H [XP H ]]	**	**

The specifier in the highest projection of candidates b. and c. separates the head from the left edge of its projection, and further separates the complement from the left edge of the projection. This is true regardless of whether the specifier is part of a chain as in c. or independent as in b. These are structurally identical candidates differing only with respect to the lexical material occupying head positions within them.

So how does general economy of movement emerge? How does a grammar choose between pairs of candidates which stand in this relationship to each other? Obviously constraints on structure cannot distinguish structurally equivalent candidates; hence, economy of movement cannot follow from the structural markedness constraints which lead to economy of structure effects. The proposed answer is (3).

(3) Economy of structure is entailed by markedness constraints.  
Economy of movement is entailed by faithfulness constraints.

### 3. Unfaithful Candidates

Among the candidates that GEN constructs are unfaithful candidates, i.e. candidates which do not fully respect the properties of an input.<sup>2</sup> Examples include epenthetic elements like expletive *do* and *it* (Grimshaw 1997, Grimshaw and Samek-Lodovici 1998). A chain is just one kind of unfaithful candidate, one in which a single input element has multiple output correspondents.

An output is any X-bar theoretically legitimate representation (the details of what counts as legitimate are not crucial here). The set of output structures is the (nonfinite) set of admissible phrase structures and lexical instantiations thereof. For present purposes, I assume, as I did in Grimshaw 1997, that an input specifies an

<sup>2</sup> Within syntactic systems we do not find faithfulness violations as massive as we find in phonological systems. For example, entire phrases do not seem to be omitted to improve on alignment. The reason for this is obvious – preserving lexical content is quite different from preserving segments. However, this has not been formally explicated.

argument structure, and the lexical heads of the arguments, plus grammatical information such as +/- *wh*, +/- *def.*, +/- *sg.* and so forth. There are infinitely many potential outputs for a given input. Every output defined by GEN is a potential output, and the set of outputs that participate in evaluation *is the same for every input*. To put it another way, every possible realization/representation of the input must be evaluated by the ranked constraints as a realization for each input.

Table (4) illustrates this for examples without chains. Some of the candidates are flagrantly unfaithful, but they are candidates nonetheless.<sup>3</sup>

(4)

Column 1 input 1: loves (Bill, Mary)	Column 2 input 2: gives (Bill, Mary, bicycle)
Spec V Comp a. Bill loves Mary	Spec V Comp a. Bill loves Mary
V Comp Spec b. loves Mary Bill	V Comp Spec b. loves Mary Bill
Spec V Comp c. Mary loves Sue	Spec V Comp c. Mary loves Sue
Spec V Comp d. Bill hates Mary	Spec V Comp d. Bill hates Mary
Spec V Spec V Comp e. Bill gives Mary a bicycle	Spec V Spec V Comp e. Bill gives Mary a bicycle
Spec V Spec V Comp f. Bill gives Sue a bicycle	Spec V Spec V Comp f. Bill gives Sue a bicycle
etc.	etc.

### 3.1 When unfaithful candidates cannot be optima

Infinitely many of these candidates are, while constructed by GEN, useless. They are never actually relevant to the computation of optimality. They are harmonically bounded (see Prince & Smolensky 1993/2004, Samek-Lodovici & Prince 2002). A candidate is harmonically bounded/an inevitable loser if for every ranking of the constraints, there is a better candidate (formulation based on Samek-Lodovici and Prince 2005).

Two kinds of constraints play a role in establishing harmonic bounding. The set of constraints which I abbreviate as FAITH-LEX assigns violations for output lexical items that are not in the input: e.g. *John* in the input, *Mary* in the output. (FAITH-LEX constraints do not refer to grammatical features). The second set of constraints I abbreviate as SYNT-MARK. These constraints are formulated in terms of the vocabulary of syntax and morphosyntax: “head”, “definite”, “N”, +*wh* etc. They do not refer to the lexical content of a head.

An unfaithful candidate competes with all other candidates, including a faithful candidate with the same structure. This is enough to guarantee harmonic bounding.

<sup>3</sup> “That’s not to suggest a superiority of the faithless, but an equivalency, at least”  
<http://shakespeareassister.blogspot.com/2005/11/holier-than-thou.html>

The unfaithful candidate will be dis-preferred by the FAITH-LEX constraints. The SYNT-MARK constraints will be unable to distinguish the faithful from the unfaithful candidates, since they have the same structure. The unfaithful candidate is therefore harmonically bounded by the faithful one. Unfaithful candidates can only be optima if their faithfulness violation(s) permit satisfaction of higher ranked constraints, which are otherwise violated. Since no constraint can mention *John*, *Mary*, or *bicycle*, no markedness constraint can force the choice of an unfaithful lexical head over a faithful one, and the unfaithful candidates can never be preferred under any ranking, i.e. in any language. (In contrast, markedness constraints do mention grammatical features, and hence can impose unfaithfulness to them. Examples occur below). Applying the reasoning of Prince and Smolensky 1993/2004, there is no point in defining GEN so as to exclude candidates which are lexically unfaithful if they will never be optima anyway.

In (4) above, candidates c. and d. in column 1 are harmonically bounded by candidate a. No structural markedness constraint can distinguish them, and a. is more faithful than c. or d. For the input in column 2 above, candidate e. harmonically bounds all structurally identical candidates with different lexical heads such as f.

### 3.2 Chains are unfaithful

In a chain candidate the output contains multiple correspondents for a single input element. Candidates with multiple correspondents *are* candidates; GEN constructs these along with other unfaithful input~output mappings like those just discussed. In all the outputs in (6) except a. one input element (*who*) is in correspondence with two output elements. It is this property of chains that makes them unfaithful.

(5) <seen (*he*, *who*) has>

- (6) a. [he has seen **who**]  
 b. [**who** he has seen **who**]  
 c. [**who**he has seen **t** ]

### 3.3 Assessing unfaithfulness

A candidate with no chain in its output structure is necessarily more faithful than an otherwise matching candidate with a chain. The faithfulness constraints guarantee that a chain candidate can never win over candidates with no chain, other things being equal.

Consider a set of faithfulness constraints as applied to chains.

## (7) Informal Definitions based on McCarthy and Prince 1997/99: 55-56.

A chain satisfies MAX:	If every element of the input has a correspondent in the output.
It satisfies DEP:	If every element in the output has a correspondent in the input
It satisfies IDENT(F):	If every element in the output is identical in feature F to its input correspondent
It satisfies UNIQUE: <sup>4</sup>	If no element of the input has multiple correspondents in the output.

All four of these constraints can be satisfied when the output contains no chain. None of the four can be better satisfied by multiple correspondents. The constraint IDENT is violated by candidates with multi-member chains and non-identical chain members. UNIQUE, on the other hand is violated by any chain with more than one member, even if the members are identical. (I will combine the two in the tableaux below, because both are violated in all of the chain candidates under consideration.)

In (6), the first structure satisfies all of the faithfulness constraints. Output b. violates UNIQUE but satisfies all of the other constraints. In the input~output pair in b. every output element in the chain (*who*, *who*) has an input correspondent, namely <who>. Every element in the input has an output correspondent. All correspondents of <who> are identical to it. Therefore MAX, DEP and IDENT are all satisfied in b. In c. IDENT is violated, since the chain (*who*, *t*) contains a correspondent for <who>, which is not identical to it.

Since it is UNIQUE that is systematically violated by movement, it is this constraint that will give a general economy of movement effect. Is the constraint in any sense an “economy constraint”? (cf. Grimshaw 2001, 2002 for the same point). UNIQUE is in no way specialized for cases that are usually analyzed as involving movement. Without UNIQUE, there would be free doubling (and more) of input elements in outputs. To put it another way, UNIQUE bans copying in general, not just for movement. Without UNIQUE, copying would occur *freely*. Constraint conflicts would be resolved by copying without a concomitant constraint violation. Suppose, for example, that a constraint requires that every right edge of some domain is aligned with an element such as a head. Another constraint imposes the same requirement for every left edge. This conflict will be resolved, for free, harmonically bounding other resolutions, by doubling the required alignee.

Economy of structure follows because every phrase is guaranteed to violate at least one markedness constraint; hence phrases are reliably costly. Similarly, every chain is guaranteed to violate a faithfulness constraint and chains cannot be present in grammatical sentences, other things being equal. It is not just the case that *some* chains are unfaithful, *all chains* violate faithfulness, and hence there is a general anti-chain preference, known as “economy of movement”.

#### 4. Evaluation of Chains

Non-trivial chains occur in winning candidates only when the constraint(s) violated by the chain are dominated by constraints which are satisfied by a chain and not

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<sup>4</sup> McCarthy and Prince’s “INTEGRITY”, renamed for ease of recognition in the current context.

otherwise.. The well-formedness of candidates with chains depends on ranking. Chains can be excluded from optima because they are unfaithful. They can occur in optima despite the fact that they are unfaithful. The fact that they can only occur *despite* their unfaithfulness is the source of economy effects.

#### 4.1 The chain wins

DP chains occur in optima with passives and unaccusatives, and in subject raising, among other cases. I refrain from adorning the flyspeck tableau in (8) with exclamation points since they inelegantly encode what the comparative tableaux below show perspicuously.

(8) DP to Spec position

arrested (x, the criminal)	OBSPEC	FULLINT	UNIQUE/ IDENT
a. was arrested the criminal	*		
b. it was arrested the criminal		*	
c. $\wp$ <i>the criminal</i> was arrested <i>t</i>			*

The non-realization of “x” in the input is constant across the 3 candidates, so not relevant for the choice among them. MAX is otherwise satisfied in all candidates under consideration. I am factoring out candidates which violate it, such as any candidate in which <the criminal> has no correspondent in the output. I have therefore eliminated this constraint from the tableau. Its ranking cannot be determined on the basis of this discussion.

(19) shows the pattern of violations for candidates with no chain, a. and b. and the candidate in c. which does have a chain.<sup>5</sup> The constraint OBSPEC is violated in a. and satisfied in b. and c. OBSPEC is the constraint which enforces a filled subject position, cf. SUBJECT of Grimshaw and Samek-Lodovici 1998. FULLINT (Grimshaw 1997) is violated in b.<sup>6</sup>

Since the choice of the chain candidate as optimum is ranking dependent, I turn to a comparative tableau (Prince 2002) to explicate the ranking. Since UNIQUE/IDENT prefers the loser in both comparisons, it must be subordinated to both of the constraints which prefer the winner. The chain candidate is thus optimal under a ranking in which both FULLINT and OBSPEC dominate UNIQUE/IDENT. Under this ranking, the chain candidate c. is optimal, despite its violation of UNIQUE/IDENT.

<sup>5</sup> There is another interesting chain candidate, namely “*the criminal* was arrested *the criminal*”. This candidate satisfies IDENT, which is violated by c. Analyzing this candidate requires understanding the evaluation of phonetic overtiness by markedness constraints.

<sup>6</sup> DEP might be violated in candidate b., but e this depends on whether *it* is in the input or not. Since the effect of FULLINT is input-independent, I simplify matters by not considering DEP here.



## (9) DP to Spec position -- comparative

arrested (x, the criminal)	OBSPEC	FULL INT	UNIQUE/ IDENT
<i>the criminal ... t</i> ~ was arrested the criminal	W		L
<i>the criminal ... t</i> ~ it was arrested the criminal		W	L

## (10) FULLINT, OBSPEC &gt;&gt; UNIQUE/IDENT .

Chains occur in *wh*-questions:

- (11) What have the police done?  
 \*The police have done what? (without echo interpretation)

Why doesn't the economy of movement block this chain? To put it more precisely in the terms developed here, why does UNIQUE/IDENT not block the chain here? The answer again lies in constraint interaction. With UNIQUE/IDENT dominated by at least one higher ranked constraint which is satisfied only by the occurrence of a *wh* chain, the *wh* chain candidate is optimal. The critical constraint is the one which requires *wh* phrases to occur in specifier positions at the left edge of the clause. I will assume that alignment, in the form of WHLEFT, is responsible. (See also OPSPEC of Grimshaw 1997 and Q-SCOPE of Ackema and Neeleman 1998).

## (12) Wh Fronting

done (the police, what)	WHLEFT	MAXF-WH	UNIQUE/ IDENT
a. The police have done what	*		
b. The police have done something		*	
c. $\varnothing$ <i>What</i> have the police done <i>t</i>			*

In considering the candidates in (12) I ignore the auxiliary fronting discussed below. All candidates satisfy DEP (even b.) because each output element (*what*, *something*) has a correspondent in the input (although the output element in b. is not entirely faithful to its input correspondent.) Hence DEP can be safely not represented among the constraints.

However, MAX is not satisfied by the candidate in b. since the *wh* feature in the input, which is part of the grammatical feature complex of *what*, has no correspondent in the output. WHLEFT is violated in the candidate with no *wh* movement. UNIQUE/IDENT is violated in the desired optimum. Comparative analysis of the candidates shows that the required ranking subordinates UNIQUE/IDENT to OPSPEC/WHLEFT, as we determine from the first comparison. It also subordinates UNIQUE/IDENT to MAXF-WH as we determine from the second.

## (13) Wh Fronting -- comparative

done (the police, what)	WHLEFT	MAXF-WH	UNIQUE/ IDENT
<i>what</i> .... <i>t</i> ~ The police have done what?	W		L
what .... <i>t</i> ~ The police have done something?		W	L

## (14) MAXF-WH, OPSPEC/WHLEFT &gt;&gt; UNIQUE/IDENT

**4.2 You win some, you lose some**

Among the familiar differences between main and subordinate clauses is the pattern of inversion in “yes-no” questions. In main clauses they have “I-to-C”, or inversion of the subject and an auxiliary, while subordinate questions show no inversion, having *if* (or *whether* – not analyzed here) instead.

- (15) a. Are the students happy?  
 b. \*If the students are happy?
- (16) a. The instructor will find out if the students are happy  
 b. \*The instructor will find out are the students <are> happy

The matrix optimum in (15) contains a chain. The subordinate optimum in (16) does not. Why? The core idea, common to much of the literature on the syntax of interrogatives, is that (optimal) interrogatives must contain a layer of structure to house an explicit or implicit interrogative element (taken here to be a feature). The grammar determines which version of the extra structure will be optimal. Among the possible versions are an I-to-C structure and a complementizer structure. (Some of the other candidates are included in tableau (19)).

## (17) Assumptions:

The input for yes-no questions contains the feature Y/N.

## (18) The constraints in addition to UNIQUE/IDENT are:

- MAX-Y/N requires the input feature to have a correspondent in the output
- Y/N TOP requires that this feature cluster c-command the propositional part of the clause (roughly IP).
- OBHD requires that the head of a phrase be filled. Un-lexicalized features such as isolated Y/N do not satisfy this requirement. (Cf. Grimshaw 1997).
- H-x SUB is violated if a head *x* lexically marked as +subordinate occurs in a matrix clause. The relevant instance is the head *if*.

The candidates that have the best chance of being optimal are candidates with no movement of an Aux, since these satisfy UNIQUE/IDENT, and candidates with some element filling the head position above IP, since these satisfy OBHD, and potentially satisfy Y/N TOP. (19) is the tableau for a matrix yes-no question.<sup>7</sup> The square bracket

<sup>7</sup> DEP-Y/N IS not included in the tableaux here. It is unviolated in all candidates. Its role is crucial if we extend the analysis to inputs which lack the Y/N specifications. A further

indicates the left edge of IP; the principal differences among the candidates lie to the left of the bracket. “V+Y/N” stands for a head position marked with the feature Y/N, and filled with V, and similarly for “*if*+Y/N”.

(19) Matrix yes-no questions

Y/N V (x...)	Y/N TOP	MAX-Y/N	OBHD	H- <i>if</i> SUB	UNIQUE/ IDENT
a. <i>if</i> +Y/N [ NP V ...				*	
b. Y/N [ NP V ...			*		
c. $\mathcal{P}$ V+Y/N [ NP v...]					*
d. [ NP V+y/n ...	*				
e. [NP V...]		*			

Candidate a. has *if* in a matrix clause. Candidate b. has the feature Y/N without a head to realize it, and c., the I-to-C candidate, has a violation of UNIQUE/IDENT. Candidates d. and e. each violate one of the constraints on Y/N. In d. Y/N is realized on V, but not in the right place, and in e. Y/N is not realized at all.

The comparative tableau in (20) allows us to determine the crucial rankings.

(20) Comparative tableau for matrix yes-no questions

Y/N V (x...)	Y/N TOP	MAXY/N	OBHD	H- <i>IF</i> SUB	UNIQUE/ IDENT
V+Y/N [NP v...~ <i>if</i> +Y/N [NP V...]				W	L
V+Y/N [NP v...~ Y/N [NP V ...]			W		L
V+Y/N [NP v...~ [NP V+Y/N ...]	W				L
V+Y/N [NP v...~ [NP V...]		W			L

UNIQUE/IDENT prefers the losing candidate in all four of these comparisons. It conflicts with each of H-*IF*SUB, OBHD, Y/N TOP and MAXY/N, which must therefore dominate UNIQUE/IDENT to ensure that every L is preceded by a W.

(21) H-*IF* SUB, OBHD, Y/N TOP and MAX Y/N >> UNIQUE/IDENT

The effects of UNIQUE/IDENT must be suppressed by all of these constraints, so that the chain is not ruled out. The rankings in (21) are necessary and sufficient to select the inversion optimum.

In a subordinate clause, one of these constraints has no effect, namely H-*IF* SUB. Since this constraint is violated only when *if* occurs in a matrix clause, it is vacuously satisfied in a subordinate. Tableau (19) for matrix questions, contrasts with tableau (22) for subordinate yes-no questions.

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question concerning the input is whether *if* itself might appear there. In fact, provided that *if* is in the output, it doesn't matter whether it is in the input. See Keer and Bakovic 1999, 2001.

## (22) Subordinate yes-no questions

Y/N V (x...)	Y/N TOP	MAX-Y/N	OBHD	H- <i>if</i> SUB	UNIQUE/ IDENT
a. $\varnothing$ <i>if</i> +Y/N [ NP V ...					
b. Y/N [ NP V ...			*		
c. <i>V</i> +Y/N [ NP <i>v</i> ...					*
d. [ NP V+Y/N...	*				
e. [NP V...		*			

The violations in (22) are exactly the same as those in (19), with one exception. The constraint H-*IF* SUB is satisfied in the *if* candidate in (22), since *if* is in a subordinate clause. Since H-*IF* SUB is satisfied in both the *if* candidate and the chain candidate, the lowest ranked of the constraints under consideration, UNIQUE/IDENT makes the crucial decision. Here we see an economy of movement effect.

The comparative tableau corresponding to (22) shows that every constraint favors the winner.

## (23) Comparative tableau for subordinate yes-no questions

Y/N V (N)	Y/N TOP	MAX- Y/N	OBHD	H- <i>if</i> SUB	UNIQUE/ IDENT
<i>if</i> +Y/N [NP V ~ <i>V</i> +Y/N [NP <i>v</i>					W
<i>if</i> +Y/N [NP V ~ Y/N [NP V			W		
<i>if</i> +Y/N [NP V ~ NP V+Y/N	W				
<i>if</i> +Y/N [NP V ~ [NP V..		W			

In choosing between the inversion optimum and the *if* optimum, it is the constraint UNIQUE/IDENT that selects the candidate with no chain for the subordinate clause. This is an economy of movement *effect*, but it is not derived from a stipulated economy of movement *constraint*. Instead it follows from faithfulness, under the hypothesis that chains are unfaithful outputs.

## 5. Conclusion

Non trivial chains violate UNIQUE always, and IDENT sometimes. This generates an anti-chain preference, which in turn generates economy of movement effects. The economy of movement effects do not come from stipulated economy of movement constraints, like STAY or “Procrastinate”. They emerge from the set of universal constraints and the theory of constraint interaction.

Since every chain violates UNIQUE, every chain candidate is dis-preferred and can be optimal only if all other candidates are evaluated even less positively by the constraints. Every grammar has a built in anti-chain preference, and some grammars can overcome this in some situations. While the UNIQUE violation in a chain is completely independent of ranking, the selection of a chain candidate as optimal is rank-

ing dependent. It is possible only if a constraint or constraints ranked higher than UNIQUE require the chain for optimal satisfaction. In the examples discussed here, the structural markedness constraint OBSPEC overwhelms the effect of UNIQUE in passive and similar structures. For *wh* movement, and for head movement in matrix interrogatives, markedness and faithfulness constraints contain the effects of UNIQUE.

Economy of structure and economy of movement are realities. They are properties of linguistic systems but not principles of grammar. They are emergent properties of grammatical theory, and in particular of the theory of constraint interaction.

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