Indefinites and Choice Functions

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PROJECT MUSE

Squibs and Discussion

WH-SUBJECTS IN ENGLISH AND THE VACUOUS MOVEMENT HYPOTHESIS
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In this squib I consider the Vacuous Movement Hypothesis (henceforth VMH), the notion that in English local overt *wh*-movement takes place except for subjects (George 1980, Chomsky 1986). There is considerable evidence that a *wh*-subject does not move locally to [Spec, CP] in English. However, the notion that overt *wh*-movement in English involves feature licensing/clausal typing with C (Rizzi 1996, Cheng 1991) implies that even in the case of *wh*-subjects, movement to the domain of C must still occur. Furthermore, *wh*-islands involving a *wh*-subject in the embedded clause have raised problems for the VMH under the classical treatment of *wh*-islands that attributes them to Subjacency. I propose to reconcile the evidence for and against the VMH via a simplification of the feature-checking system advanced in Chomsky 1995 and a treatment of overt movement that separates a feature chain (CH_{FF}) from a category chain (CH_{CAT}). The proposal resolves the discrepancies observed with English *wh*-subjects in a conceptually desirable way.

1 A Peculiar Asymmetry

George (1980) and Chomsky (1986) have hypothesized that local overt *wh*-movement takes place except for subjects (the VMH). For nonsubject questions the fact that movement occurs is clear from visible displacement, as well as from the inversion of subject and auxiliary in these interrogative structures.

(1) a. [$_{CP}$ What$_2$ has$_1$ [$_{IP}$ John t_1 bought t_2]]?
b. [$_{CP}$ How$_2$ has$_1$ [$_{IP}$ Mary t_1 fixed the car t_2]]?

However, in subject questions it is not clear from the surface string whether *wh*-movement and inversion have applied.

(2) Who has fixed the car?

Traditionally, two competing analyses have been available for sentences like (2). According to the VMH, the *wh*-subject remains in [Spec, IP] and Aux does not undergo inversion.

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(3) [$_{\text{CP}}$ C [$_{\text{IP}}$ who has fixed the car]]

Alternatively, the *wh*-subject moves to [Spec, CP] and Aux undergoes inversion.

(4) [$_{\text{CP}}$ who$_2$ has$_1$ [$_{\text{IP}}$ t_2 t_1 fixed the car]]

It is easy to show that both structures yield the same linear ordering. Unlike the structure in (3), the structure in (4) places subject questions in line with nonsubject questions like those in (1), giving a unified structural analysis for both types of questions.[1]

However, evidence from topicalization suggests that (3) may be the appropriate structural analysis. Lasnik and Saito (1992) present evidence that local topicalization of subjects is impossible in English.

(5) a. John, I like *t*.
b. *John, *t* left.
c. John thinks that Bill, Mary likes *t*.
d. *John thinks that Bill, *t* likes Mary.

I assume, contrary to Lasnik and Saito's original implementation, that topicalization involves movement of a DP into [Spec, CP] on a par with *wh*-movement (the embedded clause in (5c) would perhaps contain a CP-recursion structure in the sense of Authier 1992 and Browning 1996).

(6) [$_{\text{CP}}$ John$_1$ C [$_{\text{IP}}$ I like t_1]]

If we assume this analysis for topicalization, then the deviance of (5b) and (5d) confirms an analysis like (7), where the subject is forced to remain in [Spec, IP].

(7) [$_{\text{CP}}$ C [$_{\text{IP}}$ John left]]

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[1] Radford (1997:293–294) puts forth the hypothesis that the defining characteristic of an interrogative clause is that it must contain an interrogative specifier in order to be interpretable at LF as a question. Under Radford's analysis, subject *wh*-questions in English consist of just a TP. The *wh*-subject occupies [Spec, TP], and TP satisfies the requirement that a question contain an interrogative specifier. Radford claims that in this case there is no need to project the structure any further into CP and, by economy considerations, no possibility of doing so. However, theory-internal considerations may preclude such an analysis. Under the interrogative specifier analysis, the numeration from which a subject question is built must not contain C (i.e., C must not be selected in the formation of the numeration). If we assume that economy conditions operate locally, as Collins (1997) and Chomsky (1998) propose, then a global property such as ''look-ahead'' is to be avoided in favor of local determination of economy. It follows that the computational system makes use of locally determined solutions rather than comparing the numerations of alternative convergent derivations (see Chomsky 1995). With respect to subject questions, note that the choice not to select C for the numeration must be based on the eventual output of the derivation (i.e., LF convergence as an interrogative structure), involving ''look-ahead.'' This argues in favor of positing that C is present and projects in both subject and nonsubject *wh*-questions.

The evidence would thus seem to confirm the VMH and the structural analyses in (3) for subject questions and (7) for subject ''topics.''

However, considerations based on clausal typing and feature licensing have raised doubts about the VMH. For example, Cheng (1991) questions the VMH on the basis of her Clausal Typing Hypothesis, according to which either a *wh*-element or a particle must be present in CP to type a *wh*-question. This means that in English subject questions the *wh*-subject is required to be in [Spec, CP] for clausal typing. Rizzi's (1996) *Wh*-Criterion, stated in (8), also forces a *wh*-subject to raise locally to [Spec, CP] in order to license [+wh] C.

(8) a. A *wh*-operator must be in a specifier-head configuration with $\underset{[+\mathrm{wh}]}{X^0}$.
b. An $\underset{[+\mathrm{wh}]}{X^0}$ must be in a specifier-head configuration with a *wh*-operator.

Such considerations require us to adopt a homogeneous structural analysis of subject and nonsubject *wh*-questions, in which a *wh*-element, whether it is subject or nonsubject, moves to [Spec, CP] overtly, as represented in (1) and (4).

Furthermore, evidence from island effects is potentially problematic for the VMH. It is well known that embedded subject questions create *wh*-islands just like embedded nonsubject questions.

(9) ??What$_1$ does John wonder [$_{\mathrm{CP}}$ who bought t_1]?

Under the classical analysis of *wh*-island effects that attributed them to the Subjacency Condition, the fact that (9) exhibits an island effect sets up a problem for the VMH. This is because the *wh*-subject in the embedded clause in (9) appears to be occupying [Spec, CP], thereby blocking successive-cyclic movement of *what*. Evidence like (8) along with considerations of clausal typing/feature licensing suggests, contrary to the VMH, that the *wh*-subject actually moves vacuously to [Spec, CP].

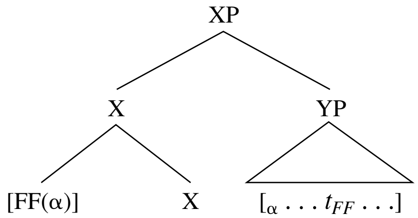
We are thus faced with a peculiar state of affairs: evidence exists in favor of the VMH, but conflicting evidence also exists suggesting that *wh*-subjects necessarily move to [Spec, CP]. This apparent paradox arises under the traditional treatment of *wh*-movement as licensing via a specifier-head relation. In order to resolve this apparent paradox, it is necessary to reconsider the structures created by overt movement.

2 The Checking System and Overt Movement

Chomsky (1993, 1994, 1995) has argued that movement is driven by the requirement of feature checking. Accordingly, he proposes (Chomsky 1995) that since movement is driven by the requirement that some feature F be checked, the minimal operation should raise only the feature F. Covert raising is restricted to feature raising, and overt raising involves ''generalized pied-piping'' of an entire category for PF convergence. Movement of a category forms a chain ($\mathrm{CH}_{\mathrm{CAT}}$) separate from the chain formed by movement of the formal features ($\mathrm{CH}_{\mathrm{FF}}$). $\mathrm{CH}_{\mathrm{FF}}$ is formed by the operation Attract F. $\mathrm{CH}_{\mathrm{CAT}}$ is formed by raising of a category carried along by generalized pied-piping.

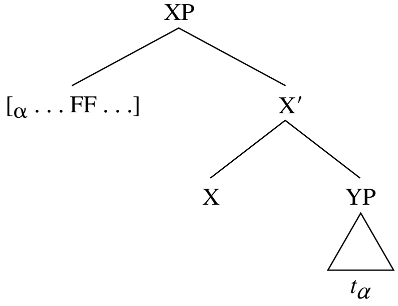
This approach sets up an overt/covert asymmetry with respect to movement. Movement in covert syntax should involve Attract F only, forming only $\mathrm{CH}_{\mathrm{FF}}$, whereas movement in overt syntax involves Attract F plus movement of the category, forming both $\mathrm{CH}_{\mathrm{FF}}$ and $\mathrm{CH}_{\mathrm{CAT}}$. Furthermore, Chomsky suggests that covert movement is simply adjunction of formal features to a head as in (10).

(10)



However, there appears to be an assumption that in overt syntax the formal features remain as part of the category that pied-pipes. The unchecked formal feature(s) of the head X enter(s) into a checking relation with the relevant formal feature(s) of the moved category through the specifier-head relation.

(11)

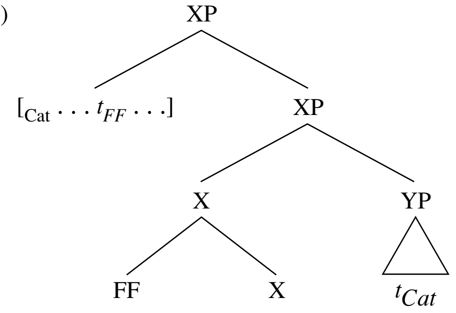


This approach sets up a heterogeneous system for feature checking, since distinct structural configurations are necessary for feature checking in overt versus covert syntax.

I suggest that only the head adjunction structure in (10) is relevant for feature checking in both overt and covert syntax. This implies that movement of the category to a specifier position in overt syntax has nothing to do with feature checking. Hence, we can dispense with the specifier-head agreement mechanism, thereby simplifying the checking theory.

This simplification of the checking theory immediately sets up a ‘‘split’’ treatment of movement in which a category and its formal features move to distinct structural positions. I propose that Universal Grammar allows feature attraction and category movement to apply separately. Attract F adjoins a set of formal features (FF) to an attracting head. A second operation, Move Cat(egory), raises the category to a specifier position where it is in a local relation with its formal features adjoined to the attracting head. Following Kayne (1994) and Saito and Fukui (1998), I assume that movement into specifier position involves XP-adjunction, forming a two-segment category. Move Cat is ‘‘phonologically induced’’: at PF a set of formal features must be in a local relation with its category; otherwise, PF is presented with a defective output.

(12)



I propose that the relation holding between FF and the category is adjacency, a local relation required by the PF interface. Adjacency is defined in (13), where the notion ‘‘visible at the interface’’ is borrowed from Chomsky 1995.

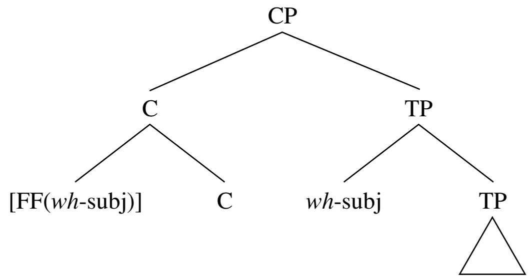
(13) X and Y are adjacent if no elements that are visible at the interface intervene between X and Y.

Elements that are visible at the PF interface include phonological features and XP- and X^0- level categories, but not segments or X′-level categories (segments and X′-level categories are also assumed to be ‘‘invisible for computation’’ (Chomsky 1995)). In structural terms an element Z intervenes between X and Y if X dominates Z and Z dominates Y. Thus, the category in [Spec, XP] in (12) and its formal features adjoined to X are adjacent according to (13). Specifier-head agreement is eliminated as a mechanism for feature licensing. A condition at the PF interface replaces it as the driving force of overt categorial displacement, in accordance with minimalist objectives.

3 The VMH Reconsidered

Now consider subject questions in light of this approach to overt movement. Suppose Attract F has adjoined the formal features of a *wh*-subject to C for checking in overt syntax. (14) shows the resulting configuration without the application of Move Cat.

(14)



The *wh*-subject is in [Spec, TP] via movement from a predicate-internal position (Chomsky 1995). In (14) FF and the *wh*-subject are adjacent according to (13), since no phonological material or XP- or X^0-level categories intervene between FF and the subject. Thus, Move Cat need not apply to place the subject in [Spec, CP] for adjacency. Since the operation need not apply in (14), I propose on economy grounds that it does not; raising of the category would introduce a superfluous step into the derivation. Economy dictates that the subject category not move to [Spec, CP], under a ''least number of steps'' interpretation of derivational economy. In English the structural position of the subject, relative to C, is sufficient to satisfy the PF requirement of adjacency. Thus, the VMH may be restated as follows: Move Cat applies in overt syntax except in the case of *wh*-subjects.

This analysis allows us to reconcile the conflicting evidence faced by the VMH. Consider first the issue of how clausal typing/feature licensing is satisfied in subject questions. Under this approach, unlike the classical analysis, clausal typing or feature-licensing requirements are satisfied by adjunction of a [+ wh] feature to C. These requirements are met by the configuration in (14), where FF is adjoined to C.[2]

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[2] It is well known that a *wh*-subject can appear as a remnant of sluicing.

(i) Someone left early. Guess *who* . . .

If sluicing is analyzed as movement to [Spec, CP] followed by PF deletion of TP, then the fact that the subject category appears at all after sluicing might appear problematic. However, the PF adjacency requirement would be violated if the category were deleted but the formal features remained in the overt component. Thus, the *wh*-subject cannot be deleted.

The question also arises of how the adjacency requirement is satisfied in phrasal pied-piping cases like (ii), with $[_{DP}$ a picture of whose mother] in [Spec, CP].

(ii) $[_{CP}[_{DP}$ a picture of whose mother] [FF]-C . . .]

One possibility, rooted in classical proposals for phrasal/clausal pied-piping, is that the [+ wh] feature of *whose* percolates to the head of the upper DP prior to the application of Attract, so that the category associated with FF in (ii) is the entire DP *a picture of whose mother*. A related question arises as to what, under this analysis, rules out left branch extractions like **Whose*$_1$ *did you meet* t_1 *mother?* Such facts suggest that the object affected by Move Cat must be a maximal phrase and not a head.

The split approach to overt movement adopted here straightforwardly resolves the apparent conflict between the VMH and the Clausal Typing Hypothesis/*Wh*-Criterion.[3]

Let us now turn to the problem posed by the existence of island effects with embedded subject questions. According to Chomsky (1995), the Minimal Link Condition (MLC) built into Attract F derives the *wh*-island effect. Consider again example (9).

(15) ??What$_1$ does John wonder [$_{\text{CP}}$ who bought *t_1*]?

According to the MLC, attraction of the [+wh] feature of *what* over the [+wh] feature of *who,* the closer relevant feature, violates economy. Here the locality relation is defined over formal features that are potential attractees. If the formation of CH$_{\text{FF}}$, but not CH$_{\text{CAT}}$, obeys the MLC built into Attract, then the existence of an island effect in (15) indicates only that the formal features of the embedded subject have raised to the embedded C. If the formal features of *what* could adjoin to the embedded C, it could raise to the matrix C without violating the MLC. However, if the checking requirement of the embedded C has already been satisfied by the [+wh] feature of *who,* then there is no motivation for the [+wh] feature of *what* to raise to the embedded C. The category of the *wh*-subject is irrelevant for the existence of the island effect in (15). The structure of (15) would be (16), where the embedded subject does not undergo movement to [Spec, CP].

(16) What$_1$ does John wonder [$_{\text{CP}}$[FF(who)]-C [$_{\text{TP}}$ who [$_{\text{TP}}$ . . . bought *t_1*]]]?

Some intriguing facts that bear on this treatment of overt movement arise in the case of anaphor binding. Consider the following examples from Lasnik 1995:

(17) a. The DA proved two men to have been at the scene during each other's trials.
b. *The DA proved there to have been two men at the scene during each other's trials.

(18) a. Some linguists seem to each other *t* to have been given good job offers.
b. *There seem to each other *t* to have been some linguists given good job offers.

These examples show a contrast between cases of DP-raising (exceptional Case marking/''raising to object'' (17a) and ''raising to subject''

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[3] Note that this analysis is silent about why there is no inversion or *do*-support in root subject *wh*-questions. One view consistent with the present approach is to say that inversion in root *wh*-questions is triggered by the presence of a *wh*-phrase in [Spec, CP]. This view takes inversion to be an ancillary property of root *wh*-questions, perhaps applying in the phonological component (see Chomsky 2000:149 n. 68, for a suggestion along these lines for head movement in general).

(18a)) and cases in which a DP is the associate of *there*. The assumption is that the (a) examples involve overt raising of a DP, whereas the (b) examples involve covert feature movement to the neighborhood of the expletive. It is also assumed that anaphora is governed by output conditions at LF. Lasnik argues that the deviant status of the (b) examples can be explained if features of the associate related to anaphora remain in a lower position than the expletive, even at LF. On the other hand, in the (a) examples the relevant licensing features raise to a higher position. If the formal features are not responsible for anaphora, then the contrasts above are easily accounted for, since the category (minus the formal features) of the associate DP in the (b) examples never raises to the expletive, even though the formal features of the associate have raised to a higher position. The features that are responsible for anaphora, not being part of FF, would remain in a lower position with the rest of the DP. The (a) examples show that Move Cat actually has an effect that is ''visible'' to LF, in that it may serve to license anaphora. The nonapplication of Move Cat does not license anaphora, as shown by the expletive-associate cases.[4]

Recall that local topicalization of subjects is impossible, according to Lasnik and Saito (1992). Topicalization, under the present approach, is treated as overt raising of the formal features of a DP to C as required by Attract F. In the case of a nonsubject DP, the category moves to [Spec, CP]. However, in the case of a subject DP, the application of Move Cat is blocked by economy, as shown in (19) (this implies that a subject may be interpreted as a topic by virtue of its formal features being adjoined to C without movement of the category).

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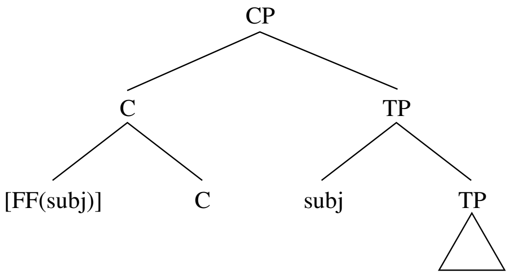
[4] This is contrary to Chomsky's (1995:272) claim that ''FF(LI) includes the categorial feature of the nominal phrase and should have argument (A-position) properties, including the ability to serve as a controller or binder.'' Chomsky uses the following contrast to illustrate this point:

(i) a. The DA [proved [the defendants to be guilty] during each other's trials].
  b. *The DA [proved [that the defendants were guilty] during each other's trials].

According to Chomsky, covert raising of the features of *the defendants* in (ia) allows the binding relation to be established with the anaphor *each other*. Chomsky's contrast in (ia) and (ib) is unexpected given my assumption (based on Lasnik's (1995) facts in (17) and (18), and my analysis of subject topicalization to follow) that FF(LI) does not license anaphora. One way to resolve this contradiction would be to adopt a ''predicate-raising'' analysis of *there*-sentences (see Hoekstra and Mulder 1990, Moro 1991, Zwart 1992, Aoun and Li 1993, Den Dikken 1995, and Authier and Reed 1999). However, such an approach would not allow a unified account of Lasnik's contrasts and the subject topicalization facts to be discussed. This unified account is a major strength of the present analysis.

(19)



In light of this analysis, consider further evidence discussed by Lasnik and Saito (1992). In (20a) the anaphor *himself,* which is topicalized from object position in the embedded clause, can take *John* in the matrix clause as its antecedent (contrast (20a) with **John thinks that Mary likes himself,* with the anaphor in situ). However, if *himself* is a topicalized subject as in (20b), it cannot take *John* as its antecedent.

(20) a. John thinks that himself, Mary likes *t*.
b. *John thinks that himself, *t* likes Mary.

I assume that a CP-recursion structure is present in the embedded clauses in (20). (20a) shows that movement to CP allows an anaphor to ''find'' its antecedent in the next clause up. If subject topicalization is blocked, then (20b) is independently explained, since *himself* cannot be topicalized, hence cannot be moved to CP. (20b) would be on a par with (21), in which *himself* is the subject of the embedded clause and cannot take *John* in the matrix clause as its antecedent.

(21) *John thinks that himself likes Mary.

However, under the classical formulation of the VMH it is not clear why the subject should remain in situ. According to the treatment of the VMH adopted here, economy forces the subject category in (20b) to stay in [Spec, TP], even though FF adjoins to C in overt syntax. Assuming that features relevant for anaphor binding are not part of FF, then the contrast in (20) again suggests that the location of the category affects binding. In (20a) the object category moves to [Spec, CP], from which it can be bound by an antecedent in the higher clause. In (20b) the subject category remains in the lower TP. In both examples FF undergoes Attract F. The difference lies in the location of the category.

4 Conclusion

In this squib I have reconsidered the nature of the VMH in English. I have shown that the evidence for and against the VMH can be reconciled under a split treatment of overt movement in which a feature chain and a category chain are formed. This approach to overt movement also straightforwardly captures the anaphor-binding facts with topicalization observed by Lasnik and Saito (1992) in a way that is consistent with Lasnik's (1995) asymmetries involving anaphor binding under covert versus overt movement.

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VOWEL HIATUS AND FAITHFULNESS IN TOHONO O'ODHAM REDUPLICATION

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1 Introduction

The relationship between the base and the reduplicant holds a special place in the current theory of Prosodic Morphology. Within Optimality Theory, correspondence theory (McCarthy and Prince 1995, 1999) uses faithfulness constraints to regulate the relationship between base and reduplicant. Faithfulness relations hold between input-base (IB), base-reduplicant (BR), and input-reduplicant (IR). McCarthy and Prince (1999:232) claim a universal metacondition on ranking ''which ensures that faithfulness constraints on the stem domain always dominate those on the affixal domains.'' This means that IR faithfulness constraints are always ranked below the other two types. The low ranking of IR faithfulness makes it essentially irrelevant to the model in (1). This Basic Model of reduplication characterizes input-output (IO) faithfulness as IB faithfulness.

(1) *Basic Model* (McCarthy and Prince 1999:232)
Input: /Af-RED + Stem/
⇃↾ *IO faithfulness*
Output: RED ⇆ BASE
BR identity

Fieldwork was supported by a PDQWL grant awarded under the auspices of SUNY at Buffalo. Thanks to Michael Hammond, Karin Michelson, Alissa Melinger, Yongeun Lee, Julie Olenn, members of LING 201 at San José State University in the spring semester 1997, two anonymous reviewers, and Elan Dresher for helpful comments. Special thanks to Del Ortiz for sharing his knowledge of Tohono O'odham. I take credit for any errors.

Given this claim, there should be no language that provides evidence to the contrary. However, evidence from Tohono O'odham[1] shows that IO faithfulness is not equivalent to IB faithfulness.[2] IO faithfulness constraints must be evaluated globally over the entire output string. If an input element is present in some part of the output, whether base or reduplicant, then $\text{M}{\small\text{AX}}_{\text{IO}}$ is satisfied. In addition, Tohono O'odham provides evidence in favor of a fuller model of reduplication, which allows all possible rankings of the three types of faithfulness, especially a higher ranking of IR faithfulness. The evidence comes from Tohono O'odham reduplication, which tolerates a certain type of vowel hiatus in unreduplicated words, but not in reduplicated words. I show that hiatus resolution requires the high ranking of an IR faithfulness constraint. The analysis of Tohono O'odham reduplication favors the Full Model, pictured in (2), over the Basic Model in (1), as the Full Model allows the free ranking of the three types of faithfulness relations.

(2) *Full Model* (McCarthy and Prince 1999:232)

$$\begin{tikzcd}
\text{Input:} & & \text{/Af-RED+Stem/} \arrow[dl, shift left, "\textit{IR faithfulness}"'] \arrow[d, shift left, "\textit{IB faithfulness}"] \\
\text{Output:} & \text{RED} \arrow[ur, shift left] \arrow[r, shift left] & \text{BASE} \arrow[l, shift left, "\textit{BR identity}"] \arrow[u, shift left]
\end{tikzcd}$$

The analysis advocated here supports the fully symmetric model of correspondence relations in (2), rather than the asymmetric model in (1). Tohono O'odham hiatus resolution has two consequences for the correspondence model of reduplication. First, this analysis argues that IO faithfulness is not equivalent to IB faithfulness. This differs from McCarthy and Prince 1995, where the Basic Model of (1) characterizes the two as equivalent. Second, this analysis disputes the claim that there is a metacondition on ranking, such that stem faithfulness constraints universally outrank affixal faithfulness constraints. The hiatus facts favor a ranking of IR over IB faithfulness constraints.

The squib is organized as follows. In section 2 I introduce the facts of reduplication and vowel hiatus in Tohono O'odham. In section 3 I analyze these facts to motivate the distinction between IO and IB faithfulness, to favor the reduplicative model in (2) rather than the one in (1). In this section I also show that IB and BR faithfulness constraints must rank below IR faithfulness. As a result, affix faithfulness constraints must be allowed to be ranked freely with regard to stem faithfulness constraints.

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[1] Tohono O'odham (Papago) is a Uto-Aztecan language spoken in Arizona and Mexico. Sources include Fitzgerald 1997, Mathiot 1973, Saxton, Saxton, and Enos 1989, Zepeda 1988, and the author's fieldwork. *(Sp)* indicates a Spanish loanword. Space constraints limit the data presented.

[2] See also Struijke 1998 on reduplication and Fitzgerald 1998 on accent systems.

2 Vowel Hiatus and Syncope in Tohono O’odham

Before looking specifically at cases with vowel sequences, we will examine the pattern of reduplication in words where the initial syllable consists of a short vowel and an optional coda. As illustrated in (3), Tohono O’odham reduplication consists of the prefixation of a light syllable template. The resulting reduplicated word has the shape C_1V_2-C_1V_2X (where X represents the rest of the word).[3]

(3) *The general pattern of reduplication in Tohono O’odham*[4]

Reduplicated	*Unreduplicated*	*Gloss*
gó-gogs	gógs	‘dog’
hí-him	hím	‘walking’
ʔú-ʔuwi̥	ʔúwi̥	‘woman’
čá-čaŋgò	čáŋgo	‘monkey (Sp)’

Tohono O’odham has a five-vowel inventory, [i, ɨ, u, o, a], with twenty-five possible permutations. Five of these are identical vowel sequences, represented as long vowels. Thirteen of the remaining twenty possible vowel sequences are attested in Tohono O’odham words: [ia, iu, io, ɨa, ɨi, ɨu, ɨo, ua, ui, oi, oa, ai, au].[5] Sequences are generally tautosyllabic, although some words treat [ia] as belonging to separate syllables.

Vowel sequences do not behave uniformly under reduplication. The asymmetry lies in whether the base contains both of the vowels in the cluster. In (4) the vowel sequences [ia, ɨi, ɨa, ui, oi, ai, au] reduplicate only the first vowel, and the base preserves both vowels. The reduplicated word has the form C_1V_2-$C_1V_2V_3X$.

(4) *Hiatus preservation and reduplication*

Reduplicated	*Unreduplicated*	*Gloss*
ǰí-ǰiawùɺ	ǰíawuɺ	‘a devil or demon’
ɲɨ́-ɲɨid	ɲɨ́id	‘seeing’
ɲɨ́-ɲɨa	ɲɨ́a	‘look, see’
kú-kui	kúi	‘mesquite tree’
hó-hoikɨ̀	hóikɨ	‘to move reiteratedly’
dá-daikùɖ	dáikuɖ	‘chair’
má-mauṣč	máuṣč	‘to lock together one’s fingers’

However, four vowel clusters, [io, ɨo, oa, ua], act differently in reduplication. These sequences consist of two vowels where the first vowel is higher than the second vowel, and one vowel is [+round].

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[3] See Hill and Zepeda 1992 and Fitzgerald 1999 for additional complications.

[4] [ɺ] is a postalveolar lateral flap. [ṣ, ɖ] are apicoalveolar. [č, ǰ] are affricates.

[5] Some research on Tohono O’odham also includes vowel-laryngeal-vowel sequences here. [iɨ, uɨ, oɨ, aɨ, ou, uo, ao] do not occur, [iu] fails to reduplicate, and [ɨu] is found only in *hɨuʔu* ‘yes’.

The forms in (5) show that these vowel sequences are split up under reduplication, with one vowel appearing in the reduplicant and the other in the base. The reduplicated word has the form C_1V_2-C_1V_3X; the reduplicant includes the first vowel of the cluster, whereas the base surfaces with just the second vowel. The vowel cluster is systematically avoided in reduplicated words.

(5) *Resolution of hiatus in reduplication*

Reduplicated	*Unreduplicated*	*Gloss*
hí-hopčìg	híopčig	‘to be full of body lice in one place’
ʔí-ʔoldakùɖ	ʔíoldakùɖ	‘bean pot used for frying beans’
čɨ́-čoǰ	čɨ́oǰ	‘boy, man’
ɲɨ́-ɲok	ɲɨ́ok	‘talking’
dó-da	dóa	‘to be healthy’
kó-kawùɹ	kóawuɹ	‘any species or edible fruit of the wolfberry’
čú-čamà	čúama	‘roast in ashes’
wú-pandì	wúandi	‘a glove (Sp)’

The following generalizations hold here. First, the reduplicant contains only one vowel, V_2. Second, with this type of hiatus in the initial syllable, the base does not contain both input vowels, but instead surfaces with only one vowel, V_3. A comparison of the base and the reduplicant shows that the reduplicant contains contiguous material (C_1V_2-BASE), whereas the base ‘‘skips’’ material (RED-C_1V_3, as opposed to RED-C_1V_2).[6]

3 Hiatus Resolution via Input-Reduplicant Faithfulness

In the previous section I showed that there are two patterns of reduplication for words with vowel sequences. In this section I account for both patterns by showing that IO constraints are not equivalent to IB constraints. Max$_{\text{IO}}$ must evaluate faithfulness over the entire output, rather than just over the base. I further show that IR faithfulness constraints dominate faithfulness constraints in the IB and BR domains.

The basic pattern of reduplication prefixes a CV reduplicant. A high-ranking templatic constraint (Red $=\sigma_{\text{CV}}$, after McCarthy and Prince 1994) prefers a light syllable. The base and reduplicant are not completely identical; this fact supports the low ranking of Max$_{\text{BR}}$, the faithfulness constraint that regulates BR identity. A low ranking of Max$_{\text{BR}}$ also predicts that an input vowel cluster results in a reduplicated word of the shape C_1V_2-C_1V_2 V_3X. Tableau (6) shows this result for such a reduplicated word.

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[6] See also the few cases with complex onsets: *tɹáːmba, tɹá-ɹambà* ‘tramp (Eng)’.

(6) *Evaluation of /RED-daikuɖ/ 'chair'*

/RED-daikuɖ/	Red$_{CV}$	Max$_{BR}$
a. dái-daikùɖ	*!	***
☞ b. dá-daikùɖ		****

The first vowel appears in the reduplicant, and both vowels surface in the base. This is the pattern we expect to surface for most vowel clusters, and so far this hierarchy is sufficient. Vowel clusters with hiatus resolution require additional constraints.

We can compare the unreduplicated word *dóa* 'to be healthy' with its reduplicated counterpart, *dó-da.* Hiatus resolution under reduplication means that a high-ranking constraint against such sequences must outrank faithfulness constraints; otherwise, these vowel sequences would surface in both types of words (a type of ''emergence of the unmarked'' as in McCarthy and Prince 1994). The proposed constraint, *HL[+RD], prohibits [+round] vowel clusters when the first vowel is higher than the second.

(7) **HL[+RD]*
For a sequence V_xV_{x+1} where one of the two vowels is [+round], V_x must not be higher than V_{x+1}.

This constraint is violated by any form meeting the description in (7), regardless of whether the form is reduplicated. Tableau (8) clarifies the role played by *HL[+RD]. Under a partial evaluation, four candidates appear equally optimal, including the attested output, *dó-da* 'to be healthy'. (Candidates that are incorrectly selected as optimal are marked with *☞.)

(8) *Partial evaluation of /RED-doa/*

/RED-doa/	Red$_{CV}$	*HL[+RD]
☞ a. dó-da		
*☞ b. dó-do		
*☞ c. dá-da		
*☞ d. dá-do		
e. dóa-doa	*!	**
f. dó-doa		*!

Two candidates are ruled out by these constraints. Output (8e) violates Red$_{CV}$, and (8f) fails because of the proscribed vowel cluster. This leaves (8a–d), which equally satisfy these two constraints by avoiding the dispreferred vowel sequences. Forms (8a–d) are not all equally faithful; in fact, the actual output, (8a), violates Max$_{BR}$ (see tableau (9)). Forms that have identical vowels in the reduplicant and the base fare better on Max$_{BR}$. The fact that such outputs are never attested tells us that Max$_{BR}$ is ranked fairly low in the hierarchy, and the violation incurred by (8a) must be balanced by satisfaction of a higher-ranked constraint. Tableau (9) includes only Max constraints and evaluates the first three candidates from tableau (8). The outputs equally violate Max$_{IB}$ (forcing IB faithfulness) and Max$_{IR}$ (forcing IR faithfulness), whereas only one candidate violates Max$_{BR}$.

(9) *Max constraints and /RED-doa/ (*dó-da *'to be healthy' is the actual output)*

/RED-d$_1$o$_2$a$_3$/	Max$_{BR}$	Max$_{IB}$	Max$_{IR}$
a. d$_1$ó$_2$-d$_1$a$_3$	*!	*	*
*☞ b. d$_1$ó$_2$-d$_1$o$_2$		*	*
*☞ c. d$_1$á$_3$-d$_1$a$_3$		*	*

The Max constraints exclude the optimal (9a). A high ranking of these constraints would incorrectly discard the optimal candidate, suggesting that some other constraint must dominate the Max constraints. We must explain why (9a) is the actual optimal form, when (9b–c) both perform better in terms of BR identity because of the identical surface form of base and reduplicant. One important difference is that (9a) actually surfaces with each segment of the input. In contrast, (9b) contains no correspondent of a_3, and (9c) contains no correspondent of o_2. Putting aside the issue of reduplication, (9a) is faithful to the input, whereas the other two are not. This is a case of IO faithfulness, rather than correspondence of the base or the reduplicant to either each other or the input. Max$_{IO}$ must be ranked high to avoid deleting an input element from the output.

(10) *Max$_{IO}$* (McCarthy and Prince 1995:264)
Every segment of the input has a correspondent in the output.

Max$_{IO}$ cannot be limited to IB faithfulness, as in McCarthy and Prince 1995.[7] The data presented here show that Max$_{IO}$ evaluates a fourth dimension of faithfulness, a more global evaluation, together with Max$_{IR}$, Max$_{IB}$, and Max$_{BR}$. The evidence for this comes from the preferred pairing of input /RED-d$_1$o$_2$a$_3$/ with the attested output *d$_1$ó$_2$-d$_1$a$_3$* over the unattested **d$_1$ó$_2$-d$_1$o$_2$*.

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[7] See the behavior of Dep$_{IO}$ in tableau (24) in McCarthy and Prince 1995: 277.

Furthermore, Max$_{IO}$ must dominate *HL[+RD] to preserve the marked sequences in unreduplicated words.[8] Tableau (11) reevaluates the forms from tableau (9). Max$_{IO}$ plays a critical role in rejecting both (11b–c) because some input segments are not present anywhere. In contrast, (11a) satisfies Max$_{IO}$ because each indexed element of the input surfaces somewhere in the output.

(11) *Partial evaluation of /RED-d$_1$o$_2$a$_3$/*

/RED-d$_1$o$_2$a$_3$/	Red$_{CV}$	Max$_{IO}$	*HL[+RD]
☞ a. d$_1$ó$_2$-d$_1$a$_3$			
b. d$_1$ó$_2$-d$_1$o$_2$		*!	
c. d$_1$á$_3$-d$_1$a$_3$		*!	

The preference for (11a) over the other two candidates supports the move to a global evaluation by Max$_{IO}$ and the separation of Max$_{IO}$ and Max$_{IB}$. However, there is a remaining candidate that we must still exclude, **d$_1$á$_3$-d$_1$o$_2$*. This form has a noncontiguous string in the reduplicant (RED = C_1V_3) and contiguous elements in the base (BASE = C_1V_2). In contrast, the optimal candidate (11a) has contiguous elements in the reduplicant (RED = C_1V_2) and noncontiguous elements in the base (BASE = C_1V_3). The key is that in the reduplicant the elements occur in the same order as in the input, but in the base V_2 is skipped. The relevant constraint is Contiguity, a faithfulness constraint that rules out skipped elements (McCarthy and Prince 1995: 371). Skipped elements are tolerated only in the base; thus, Contig$_{IR}$ outranks Contig$_{IB}$.

(12) a. *Contiguity$_{IR}$*
The portion of the reduplicant standing in correspondence to the input forms a contiguous string.[9]

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[8] This point is demonstrated in tableau (i) for the unreduplicated word *síbio* 'hoe'.

(i) *Max$_{IO}$ and *HL[+RD] in the evaluation of /sibio/*

/s$_1$i$_2$b$_3$i$_4$o$_5$/	Red$_{CV}$	Max$_{IO}$	*HL[+RD]	Contig$_{IR}$	Contig$_{IB}$
☞ a. s$_1$i$_2$b$_3$i$_4$o$_5$			*		
b. s$_1$i$_2$b$_3$i$_4$		*!			
c. s$_1$i$_2$b$_3$o$_5$		*!			

[9] An anonymous reviewer suggests an alternative using positional faithfulness of the word-initial syllable (following Steriade 1993, Beckman 1997,

b. *Contiguity$_{IB}$*
The portion of the base standing in correspondence to the input forms a contiguous string.

The hierarchy in tableau (13) includes these two faithfulness constraints, plus Red$_{CV}$ and *HL[+rd]. The attested *dó-da* ‘to be healthy’ violates the lower-ranked Contig$_{IB}$, whereas the unattested candidate (13b) fails by virtue of violating the higher-ranked Contig$_{IR}$.

(13) *Reevaluation of /RED-$d_1o_2a_3$/*

/RED-$d_1o_2a_3$/	Red$_{CV}$	Max$_{IO}$	*HL[+rd]	Contig$_{IR}$	Contig$_{IB}$
☞ a. $d_1ó_2$-d_1a_3					*
b. $d_1á_3$-d_1o_2				*!	

This tableau shows that IR constraints must dominate IB constraints to account for hiatus resolution in Tohono O’odham reduplication. This ranking makes the correct predictions for longer words, too. Tableau (14) demonstrates this for a longer form and includes a candidate that has unforced violations of Max$_{IO}$.

(14) *Evaluation of /RED-$č_1u_2a_3m_4a_5$/*

/RED-$č_1u_2a_3m_4a_5$/	Red$_{CV}$	Max$_{IO}$	*HL[+rd]	Contig$_{IR}$	Contig$_{IB}$
a. $č_1ú_2$-$č_1u_2a_3m_4à_5$			*!		
☞ b. $č_1ú_2$-$č_1a_3m_4à_5$					*
c. $č_1ú_2$-$č_1a_3m_4$		*!			*

*HL[+rd] is fatally violated by (14a) because the base surfaces with one of the proscribed vowel sequences. The winning form, (14b), breaks up the sequence without violating Max$_{IO}$ or Contig$_{IR}$, but incurs a nonfatal violation of the low-ranked Contig$_{IB}$. Finally, candidate (14c) both resolves hiatus and deletes the final vowel, showing that excessive violations of Max$_{IO}$ will always be fatal.

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and Dresher and van der Hulst 1998). This replaces Contig$_{IR}$ with Contig$_{\sigma 1}$. There are at least three reasons why such an account fails. First, the marked vowel sequences appear in noninitial syllables, even after the same initial vowel, as in *síbio* ‘hoe’ or *čúːwua* ‘to reach puberty (female)’. This favors an analysis that invokes reduplicative faithfulness. Second, morphological truncation in Tohono O’odham deletes medial glottals, resulting in noncontiguous initial syllables: $h_1ú_2ʔ_3a_4$ (base), $h_1ú_2a_4$ (truncated word) ‘raking together’. Third, there are reduplicated words that undergo syncope in the base, if the resulting coda is well formed (Fitzgerald 1999). Such cases may have a noncontiguous initial syllable (but a contiguous reduplicant), as in the following monosyllable (*s=* is a stative clitic): $s=d_1á_2p_3k_4$, $s=d_1á_2$-$d_1p_3k_4$ ‘pressing down with fingers repeatedly’. All three examples are problematic for the Contig$_{\sigma 1}$ alternative.

4 Conclusion

In this squib I have shown that hiatus surfaces in unreduplicated words, giving evidence that hiatus is tolerated in such forms. However, in reduplicated forms hiatus is resolved in four of the possible vowel clusters [io, ɨo, ua, oa], such that the cluster does not appear in either the base or the reduplicant. Rather, the cluster is broken up so that V_2 surfaces in the reduplicant and V_3 in the base. This means that only the reduplicant contains contiguous input material. It also shows that IO faithfulness must hold over the entire string because the base and reduplicant do not each preserve the same material. The resolution of certain V_2V_3 sequences supports the presence of an antihiatus constraint that is active in reduplicated words. Additionally, the reduplicant contiguity constraint must dominate the base contiguity constraint ($\textsc{Contig}_{IR} \gg \textsc{Contig}_{IB}$), and MAX constraints on reduplication must be ranked relatively low. In this pattern of hiatus resolution the reduplicant is more faithful to the input than the base is. As a result, IR faithfulness constraints must dominate IB faithfulness constraints. This has been argued to be universally avoided (McCarthy and Prince 1995, 1999); the arguments presented here thus provide evidence that such a universal ranking cannot be the case. Finally, the analysis distinguishes between $\textsc{Max}_{IO}$ (which evaluates the input string against the entire output string) and $\textsc{Max}_{IB}$ (which evaluates the input string only against the base), showing that these are not equivalent. $\textsc{Max}_{IO}$ must evaluate IO faithfulness globally over the entire output string, rather than restricting the evaluation to only one of the morphemes in a reduplicated word. The interaction of vowel hiatus and reduplication in Tohono O'odham supports these modifications to correspondence relations for reduplicated words.

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NONCYCLIC OPERATIONS AND THE LCA IN A DERIVATIONAL THEORY

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In *A Derivational Approach to Syntactic Relations* (*DASR*), Epstein et al. (1998) present a derivational theory of syntax incorporating no levels of representation. The aim of *DASR* is to ''advance the hypothesis that the structure building rules Merge and Move (Chomsky 1994) naturally express all syntactically significant relations'' (*DASR:*3). Chapter 5 of *DASR* deduces the ill-formedness of noncyclic concatenation from assumptions needed independently to maintain such an approach to syntactic relations. However, another section of *DASR* (section 2.4) presents a derivational analysis of several binding phenomena that relies crucially on the noncyclic application of Merge. Thus, *DASR* appears to make contradictory assumptions. In section 1 I review *DASR*'s deduction of the ill-formedness of noncyclic applications of concatenation, discussing the Merge/Move algorithm and Kayne's (1994) Linear Correspondence Axiom (LCA) in turn. In section 2 I examine some binding phenomena and the *DASR* account of them. In section 3 I clarify the incompatibility between the *DASR* account of

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the prohibition on noncyclic concatenation and the *DASR* account of the binding phenomena discussed in section 2.[1]

1 The *DASR* Model: Concatenation and the LCA

Before we consider the *DASR* approach to excluding noncyclic operations, it is necessary to specify some general assumptions. *DASR* assumes that there are no levels of representation: a fortiori, that there are no levels of representation at which interpretation can take place. Rather, all relations necessary for interpretation are established by transformational operations applying iteratively within the derivation, whereas interpretation (semantic and phonological) is performed on the output of each transformational operation. More specifically, all syntactic relations (particularly c-command) derive from the application of concatenation, which is, informally, the minimal syntactic operation taking A and B and putting them together to form a constituent C. Binary concatenation is a property shared by both Merge and Move (see Kitahara 1995).

(1) *Merge*
Applied to two objects A and B, Merge forms the new object C by concatenating A and B.

(2) *Move*
Applied to the category C with K and α, Move forms the new object C′ by concatenating α and K. This operation, if noncyclic,[2] replaces K in C by $L = \{g, \{\alpha, K\}\}$. (*DASR:*61)

Given these definitions, the derivational definition of c-command is stated as in (3).

(3) *C-command*
X c-commands all and only the terms of the category Y with which X was concatenated by Merge or Move in the course of the derivation.

(4) *Term*
L is a term of K iff
a. L = K, or
b. L is a term of a category concatenated to form K. (*DASR:* 61–62)

Chapter 5 of *DASR* demonstrates how noncyclic operations are precluded, given that the output of noncyclic concatenation cannot

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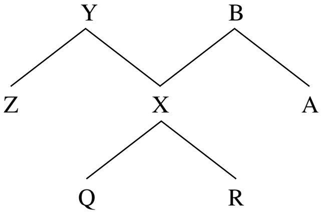
[1] For a discussion of similar issues in a different framework see Uriagereka 1998.

[2] I assume that *cyclic* operations are those that conform to the Extension Condition proposed in Chomsky 1995. Informally, this condition states that every application of a structure-building operation must target and ‘‘extend’’ the *root* node. This definition is not really at issue, however, since this squib discusses a reduction of the cycle to the LCA.

(under a strict derivational interpretation of (4)) be reinserted into the object whose term entered into the operation. *DASR*'s assumptions about noncyclic concatenation are best illustrated by (5).

(5) *DASR's assumption about the output of noncyclic merger of X + A, yielding B: No reinsertion of B (order irrelevant)* (*DASR:*146)



In (5) X and A concatenate noncyclically—that is, after X (X = {X{Q, R}}) and Z were concatenated to form Y. Under the analysis of Merge/ Move presented in chapter 5 of *DASR,* the output of the operation (i.e., the projected term B) is not ''reinserted'' into the already created syntactic object (with B immediately dominated by Y, and immediately dominating A and X). Such reinsertion, which is standardly assumed (as in (2)), would destroy the immediate dominance relation between X and Y in (5) and replace it with a new one. This is contrary to the derivational method wherein the syntactic relations into which a term T enters are established only at the point at which T is introduced into a position P. Consequently, under the *DASR* analysis of (5), neither A (the category ''added'') nor B (the category projected) is a term (see (4)) of Y, and thus neither plays a role in computing Y's compositional structure. Given this, such outputs of noncyclic concatenation as (5) are excluded in *DASR* by appeal to the independently motivated LCA, with c-command reinterpreted derivationally.

Thus, in chapter 5 the authors of *DASR* reformulate the LCA, rendering it compatible with their derivational theory. In essence, the LCA states that there is some relation that maps the terminals of a hierarchical phrase structure into a linear ordering, where a linear ordering has the following defining properties (Kayne 1994:4):

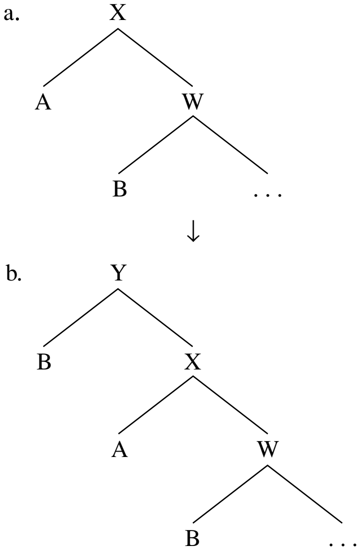
(6) a. It is *transitive;* that is, $\langle x, y\rangle$ & $\langle y, z\rangle \Rightarrow \langle x, z\rangle$.
b. It is *total;* that is, for all distinct x, y, either $\langle x, y\rangle$ or $\langle y, x\rangle$.
c. It is *antisymmetric;* that is, not($\langle x, y\rangle$ & $\langle y, x\rangle$).

In Kayne's theory the ordered pairs necessary to constitute a linear ordering are read off hierarchical representations through the relation asymmetric c-command. *DASR* adopts the LCA; however, since the *DASR* theory does not have recourse to levels of representation, a linear ordering of terminals must be achieved through some relation other than asymmetric c-command, which is representational. The obvious candidate is derivational c-command (= (3)). Thus, the derivational formulation of the LCA reads as follows:

(7) *Linear Correspondence Axiom*
If X [*derivationally,* JG] c-commands Y, then the terminals in X precede the terminals in Y. (*DASR:*151)

With such a definition of the LCA, two salient problems in deriving a linear ordering could arise in the course of a derivation. First, precedence relations could violate the requirement of antisymmetry, as when an XP moves to a c-commanding position, as B does in (8).

(8)



When A is merged with W in (8a), it is then established that A c-commands B, a term of W. By the formulation of the LCA in (7), the terminals in A precede the terminals in B; that is, ordered pairs of the form ⟨x, y⟩ (read ''x precedes y'') are formed for all x, x a terminal of A, and all y, y a terminal of B. Once B has moved (i.e., remerged with X) in (8b), it is established that B c-commands A. Thus, by the LCA, the terminals of B precede the terminals of A; that is, ordered pairs of the form ⟨y, x⟩ are formed for all y, y a terminal of B, and all x, x a terminal of A. This, however, induces a violation of antisymmetry. In other words, pairs of the form ⟨x, y⟩ and ⟨y, x⟩ are created by the movement of B in (8); informally, A c-commands B and then B c-commands A. *DASR* proposes that such contradictory inputs to the phonological component are resolved by a Precedence Resolution Principle (PRP), following work by Nunes (1995).

(9) If two (not necessarily distinct) categories symmetrically c-command each other by virtue of some syntactic operation O, ignore all c-command relations of one of the categories

> to the terms of the other with respect to establishing precedence via the LCA.[3] (*DASR:*152)

Another way in which the LCA can be violated is that precedence relations can be underdetermined; that is, totality is not satisfied. This is exemplified by the noncyclic operation in (5), where Z is first merged with X (hence, Z derivationally c-commands X, Q, and R) and A is subsequently merged with X (so, A also derivationally c-commands X, Q, and R). Crucially, then, Z derivationally c-commands neither A nor B, and conversely, neither A nor B derivationally c-commands Z. Thus, no derivational c-command relation establishes an ordering of the terminals in Z with respect to the terminals in A. That is, no derivational c-command relation explicitly relates the terminals in Z to the terminals in A. This is a violation of the totality requirement on linear orderings; that is, there are no ordered pairs of the form $\langle x, y\rangle$ where x is a terminal of Z and y is a terminal of A or where x is a terminal of A and y is a terminal of Z. *DASR* proposes that such a syntactic object lacking total precedence relations among its terminals is rejected, naturally enough, at the PF interface for violating the bare output condition Full Interpretation.[4] To sum up, in chapter 5 *DASR* seeks to deduce the ill-formedness of noncyclic concatenation by eliminating reinsertion from the Merge/Move algorithm in accordance with derivational assumptions and by implementing the LCA in a derivational theory.[5]

2 The DASR Binding Theory

In this section I point out an account of certain binding phenomena in *DASR* that utilizes the application of noncyclic operations. *DASR*'s assumptions about binding-theoretic interpretation are as follows:

(10) A: If α is an anaphor, interpret it as coreferential with some c-commanding phrase in D.
B: If α is a pronominal, interpret it as disjoint from every c-commanding phrase in D.
C: If α is an R-expression, interpret it as disjoint from every c-commanding phrase.
(where D is the relevant local domain)

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[3] Obviously, more needs to be said than this to guarantee that the correct copy is spelled out. See Nunes 1995 for ideas on this matter.

[4] We will see below that *DASR*'s deduction of the ill-formedness of noncyclic operations is incomplete. Not all derivations involving noncyclic operations can be ruled out as violations of the totality requirement on linear orderings.

[5] Notice that *DASR*'s LCA-based approach to excluding noncyclic operations only applies to operations that involve overt phonetic content.

(11) The application of ‘‘disjoint’’ interpretive procedures occurs at every point of the derivation, whereas the application of ‘‘anaphoric’’ interpretive procedures occurs at any single point of the derivation. (*DASR:*62)

Particularly important is (11), which makes full use of the derivationality of the *DASR* theory. A theory using a single level of representation for interpretation, like the ones proposed in Chomsky 1995 and Brody 1995, must interpret all binding relations at the sole interpretive level, namely, LF. On the other hand, *DASR*'s derivational theory forces LF to interpret the output of each transformational operation immediately after the operation is performed. Thus, binding relations are interpreted stepwise. To paraphrase (11), Conditions B and C apply to, and must be satisfied by, the output of each operation, whereas Condition A needs to be satisfied at only one particular stage in the derivation.

With this in mind, consider the following data, discussed in Freidin 1986 and Lebeaux 1988, among other works:

(12) a. Which claim [that John was asleep] was he willing to discuss?
b. Which [claim that John made] was he willing to discuss?[6]

In (12a) *John* is disjoint in reference from *he*. In (12b) *John* and *he* may corefer. *DASR* proposes to account for the difference between (12a) and (12b) without reference to copy theory or reconstruction. For *DASR,* traces (or copies) are at best a notational device employed for encoding previous stages of the derivation in an output representation and therefore should be eliminated. *DASR* assumes that the relevant difference between (12a) and (12b) is that in (12a) the phrase *that John was asleep* is a θ-related complement of N, whereas in (12b) the phrase *claim that John made* is a non-θ-related complement of D. *DASR* makes use of this distinction by assuming (13).

(13) The introduction of θ-related elements must be cyclic, whereas the introduction of non-θ-related elements can be noncyclic.

Thus, in *DASR* the derivation of (12b) creates the following syntactic object at some point:

(14) [was willing to discuss which]

A subsequent operation concatenates *he* with (14), establishing once and for all the set of categories that *he* derivationally c-commands. Crucially, at this point in the derivation *John* has not yet been intro-

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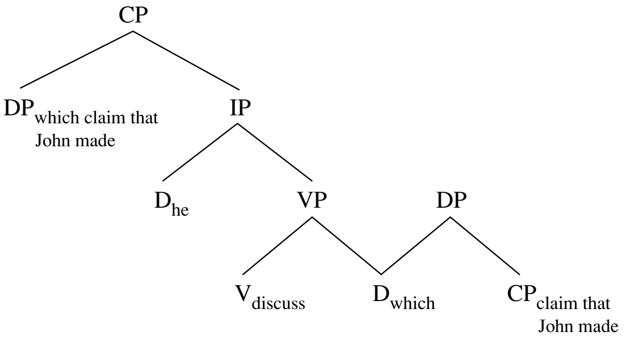
[6] This relative clause cannot be considered an ‘‘adjunct’’ under any theory that adopts the LCA. The reason is that this would require right adjunction, which is prohibited by the LCA. Thus, following Kayne (1994), *DASR* proposes the following LCA-consistent relative clause structure:

(i) [$_{\mathrm{DP}}$ which [$_{\mathrm{CP}}$[$_{\mathrm{NP}}$ claim] [$_{\mathrm{C'}}$ that [$_{\mathrm{IP}}$ John made (t)]]]] duced. Thus, in the derivation of (12b) *he* derivationally c-commands all and only the terms of (14) and does not c-command *John*. Therefore, since no c-command relation is established from *he* to *John* (or vice versa) in the derivation of (12b), the two may be interpreted as coreferential—a correct prediction. The CP *claim that John made* now merges noncyclically with *which* in (14), projecting DP. This operation is permitted by (13). Then, *wh*-movement applies, remerging the newly projected DP as [Spec, CP] of the matrix clause. In the next section I argue that this account of (12) is inconsistent with *DASR*'s assumptions about the LCA.[7]

3 The Inconsistency

Let us now see what is inconsistent in *DASR* with respect to (12). In line with *DASR*'s assumptions about noncyclic operations, as illustrated in (5), the proposed derivation of (12b) yields the structure in (15) (irrelevant structure omitted).

(15)



Recall that *DASR* shows that a noncyclic operation violates the totality requirement imposed by the LCA (see (5)). One might argue, though, that in (15) movement of the DP into [Spec, CP] resolves the violation of totality and that the *DASR* theory therefore allows a

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[7] A reviewer notes that other analyses exist that evade Condition C through other devices. Nunes (1995), for example, proposes a cyclic (i.e., Extension Condition–satisfying) derivation of (12b) that uses ''sideward'' movement. (*DASR* (see chapter 3) does not allow sideward movement.) In Nunes's analysis two separate trees are constructed: [he made which claim] & [that John made]. Next, [$_{\text{DP}}$ which claim] moves ''sideward'' and merges cyclically with [$_{\text{CP}}$ that John made]. Then, the new constituent [$_{\text{DP}}$[$_{\text{DP}}$ which claim] [that John made]] (an adjunction structure) is merged into [Spec, CP]. *He* never c-commands *John* and Condition C is not violated. There are problems, however: (a) Nunes leaves open the question of how the adjunct is ordered (see footnote 6). (b) To satisfy cyclicity, Nunes merges the relative CP at the DP level (i.e., above the determiner). This causes problems for the compositional semantics. (c) Nunes's ''sideward'' approach will not extend to (16b): to escape Condition C, the relative CP is forced to adjoin noncyclically to a DP contained in the *wh*-phrase. Thus, Nunes's analysis must also confront the problems of noncyclic operations.

derivation of (12b) that both satisfies the LCA and escapes a Condition C violation.[8] And, in fact, it is the case that totality is not violated in the derivation represented by (15). For example, although *he* (= Z in (5)) does not derivationally c-command the original position of the DP (= A in (5)), once the DP has moved into [Spec, CP], a c-command relation is established from DP to *he.* Thus, there is in fact a relation between *he* and the terminals of the DP, satisfying the totality requirement on linear orderings. Note, however, that now there is nonetheless a violation of antisymmetry: *he* c-commands and thereby precedes *which,* by virtue of having been merged with a category of which *which* is a term. Similarly, *which* precedes *he,* by virtue of being a term of a category that c-commands *he,* namely, DP. Thus, antisymmetry is violated: ⟨he, which⟩ & ⟨which, he⟩. One might wish to say that this violation is avoided by means of the PRP (9). The PRP, though, does not apply to (15). The PRP resolves cases of symmetric *c-command.* In (15) no symmetric c-command relations have been formed by the merger of DP into [Spec, CP]. The reason is clear: the moved DP does not c-command its original position (since its original position is not a term of the CP under (4)). So, for example, DP now c-commands *he;* but *he* does not c-command DP. Furthermore, the PRP does not apply with respect to *which. He* c-commands *which;* but *which,* a term of DP, does not c-command *he.* Therefore, the PRP does not apply at all in (15) and there is an unresolvable violation of antisymmetry.

One could attempt to reformulate the PRP to handle this case; but there are other problems with the *DASR* account of the contrast in (12). Specifically, (13) must be supplemented with the further stipulation that an NP is a θ-related D-complement whereas a relative clause CP is a non-θ-related D-complement. Otherwise, one might assume that all D-complements are non-θ-related. This would incorrectly allow (12a) to escape a Condition C violation by introducing the D-complement *claim that John was asleep* noncyclically.[9]

Finally, even if both of these problems are resolved, this account of (12) cannot be extended to cover the minimally different data in (16), which involve an additional embedding and exhibit the same asymmetry with respect to Condition C.

(16) a. *Which version of the claim [that John$_i$ was asleep] was he$_i$ willing to discuss?
b. Which version of the [claim that John$_i$ made] was he$_i$ willing to discuss?

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[8] In fact, *DASR* makes a similar argument (pp. 73ff.), claiming that movement has rendered the trace ''phonetically irrelevant,'' as a reviewer notes. However, traces are ill-defined concepts in *DASR,* and the PRP, which I will show does not apply here, is the device that generally prevents the lower position of a moved element from being pronounced.

[9] This argument was suggested to me by an anonymous reviewer. Note, however, that this argument applies not just to *DASR* but to any theory that adopts such a structure for restrictive relatives.

Consider a derivation of (16b). Whatever principle guarantees that *claim that John was asleep* is introduced cyclically in (12a) also guarantees that *version* is introduced cyclically as the complement of *which* in the derivation of (16b). Furthermore, (13) guarantees that *the,* an argument of *version,* is introduced cyclically. Thus, in order for (16b) to escape a Condition C violation, the relative clause *claim that John made* must merge with *the* noncyclically, crucially after *he* has merged into the subject position. Notice that in the course of this derivation no c-command relations, and therefore no precedence relations (see (7)), are established from *which* to the terms of the relative clause (or vice versa). Therefore, even if the DP, *which version of the claim that John made,* merges into [Spec, CP] and antisymmetry is not violated, there is still a violation of the totality requirement on linear orderings internal to the DP.[10]

4 Conclusion

In sum, an inconsistency exists in *DASR* concerning noncyclic operations. This inconsistency makes clear a consequence, noted by Chomsky (2000:138), of adopting both a completely derivational theory and the LCA:

> (17) Combined with Kayne's Linear Correspondence Axiom (Kayne 1994) . . . the derivational approach entails that the Extension Condition is inviolable.

In a theory that makes use of levels of representation, the cycle can be circumvented by stipulation without further consequences with respect to the LCA. This is so in the case of noncyclic concatenation, for example, since the representation formed through reinsertion will satisfy the representational version of the LCA. By contrast, *DASR*'s derivational approach to c-command and its dynamic perspective on interpretation (attractively) prevent similar appeal to stipulation. That is, the close link in *DASR* between the relations that a term T enters into in position P and the point at which T is introduced into P ensures that the noncyclic introduction of a term will produce a set of relations that violates the LCA, derivationally construed. As argued here, this leads to a serious empirical problem, stemming from an unnoted inconsistency in *DASR.*

The theory presented in *DASR* makes significant advances in the explanation of syntactic relations by showing how these might be deduced from independently motivated ''virtually conceptually necessary'' structure-building operations. Much, however, is left to further

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[10] Another argument against the derivation in (15) has been suggested to me by Samuel Epstein (personal communication). In chapter 3 of *DASR* the effects of the Proper Binding Condition (PBC) are derived from *DASR*'s assumptions about feature checking. Thus, the PBC, as a corollary of the *DASR* theory, rules out the derivation in (15), since the DP in [Spec, CP] does not c-command its original position, as noted above.

research. It was the intent of this squib to reveal one particularly thorny and exciting area to be explored.

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INDEFINITES AND CHOICE FUNCTIONS

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1 Introduction

The idea of analyzing indefinites with the help of choice functions is not new; it even has a venerable tradition in mathematical logic (see von Heusinger 1997 for details). What is new is the claim that, with the help of choice functions, specific indefinites can be interpreted without being moved about. That is, choice functions make it possible to construe specific indefinites in situ—or so it is claimed by Reinhart

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(1997), Winter (1997), Kratzer (1998), and Matthewson (1999), among others (there are various differences among these proposals, most of which I will ignore). In the following I hope to show that such claims are precipitate.

A choice function is any function that takes a set X as its argument and returns an element of X as its value. The idea is that it is choice functions that carry the existential force typically associated with indefinite expressions. Therefore, it is not the indefinite itself that has existential force. Indefinites merely introduce properties for choice functions to apply to, and choice functions are contributed by extraneous sources, the precise nature of which need not concern us here. Following Reinhart (1997) and Winter (1997), I will assume that a choice function is existentially bound somewhere between the sentence root and the position at which the indefinite occurs. For example, if *a German* in (1a) is construed specifically, we may obtain a specific reading whose representation in standard predicate logic would be as in (1b). This reading (or, at any rate, something approximating it—see below) may be rendered with the help of quantification over choice functions as shown in (1c).

(1) a. All bicycles were stolen by a German.
b. $\exists y[\text{German}(y) \wedge \forall x[\text{bicycle}(x) \rightarrow y \text{ stole } x]]$
c. $\exists f[\text{CF}(f) \wedge \forall x[\text{bicycle}(x) \rightarrow f(\text{German}) \text{ stole } x]]$

(1c) says that there is a choice function f such that all bicycles were stolen by f(German), which is equivalent to (1b) provided the predicate *German* denotes a nonempty set. This raises the question of what happens if there are no Germans. Another question that comes to mind is what exactly f’s argument is. Is it just the set of individuals that *German* happens to denote, or is it a richer object, such as the intension of *German,* for example? These questions will be addressed below.

The main points that I hope to establish are that there is no good reason for believing that choice functions allow us to construe specific indefinites in situ, and that some sort of movement is indispensable if we are to have an adequate account of specificity. It is immaterial to my argument what exactly a movement analysis must look like, although I should note that I do not equate movement with quantifier raising or anything equivalent to that: I prefer to view specificity as a pragmatic phenomenon, to be treated in tandem with presupposition projection, which on my account involves a form of movement (Geurts 1999). This, however, is as it may be, for what I want to show here is that just about any movement theory will do better than a nonmovement choice function account.

2 What Is a Choice Function?

For the time being I will adopt the extensional stance and suppose that a choice function takes as its argument the set of individuals satisfying the descriptive content of an indefinite NP. Now let us first ask: What exactly is a choice function? This is a rather obvious question, and therefore it may come as a surprise that the answer is not nearly as obvious. Here is a first stab:

(2) $\mathrm{CF(f)}$ iff $\forall \mathrm{X}[\mathrm{X} \neq \varnothing \rightarrow \mathrm{f(X)} \in \mathrm{X})]$

This says that a choice function picks an element from X provided X is not empty. This definition imposes no restrictions on f if X is empty, and this is what renders it inadequate, because it will generally yield truth conditions that are too weak. For example, if (2) is adopted, then only on the premise that there are Germans will (1a) entail that a German stole all bicycles. It has been suggested by Reinhart (1997) and Winter (1997) that this problem may be solved by revising (2) along the following lines:

(3) $\mathrm{CF(f)}$ iff $\forall \mathrm{X}[[\mathrm{X} \neq \varnothing \rightarrow \mathrm{f(X)} \in \mathrm{X}] \wedge [\mathrm{X} = \varnothing \rightarrow \mathrm{f(X)} = *]]$, where $*$ is a special object that, by definition, blocks the satisfaction of any predicate it associates with (i.e., for any *n*-place predicate P, if $\mathrm{a}_i = *$, $1 \leq i \leq n$, then $\langle \mathrm{a}_1 \ldots \mathrm{a}_n \rangle$ is not in P's extension)

This takes care of empty arguments by stipulating that f(X) yields $*$ whenever X is empty, where $*$ is the universal falsifier. This is an improvement, but it still won't do. Intuitively, one would like to say that if *a Polish friend of mine* is construed specifically, (4a) entails that the speaker has a Polish friend. Our revamped notion of choice function does not account for this, however, since it implies that (4a) is true if the speaker does not have any Polish friends.

(4) a. I didn't introduce Betty to a Polish friend of mine.
b. $\exists \mathrm{f}[\mathrm{CF(f)} \wedge \neg[\text{I introduced Betty to f(Polish-friend-of-speaker)}]]$

Is there any way of defining and deploying choice functions that will deliver the right truth conditions for specific indefinites? Not as long as it is insisted that specific indefinites be interpreted in situ. When we consider why a representation like (4b) is inadequate, the answer must be, evidently, that it should state that the speaker has a Polish friend at the point at which the choice function is introduced. But that requires movement, which is precisely what choice function theorists are determined to do without. I concede that this diagnosis is still a bit impressionistic, but it will solidify as we proceed.

These problems are serious enough, but there are others that are at least as serious, and while discussing the latter I will assume, for argument's sake, that the former can somehow be solved. So I propose to ignore the problems discussed in the foregoing, and I simply suppose that, say, (4b) is an adequate representation of the intended reading of (4a). What I want to show is that, even then, various other problems arise, each of which indicates that a nonmovement treatment of specificity is too tall an order.

3 Troublesome Pronouns

Winter (1997) points out that the choice function analysis runs into trouble over examples like the following, in which an indefinite NP contains a pronoun that is bound by a higher quantifier:

(5) Every girl gave a flower to a boy she fancied.

The problem with this type of example is that, without further provisions, there is nothing in the choice function account to block the following reading:

(6) $\exists f[CF(f) \wedge \forall x[girl(x) \rightarrow$
$x \text{ gave a flower to } f(\lambda y[boy(y) \wedge x \text{ fancied } y])]]$

That this is a disturbing consequence may be seen as follows. Suppose there are two girls, Betty and Wilma, who happened to fancy the same boys. Therefore, $\lambda y[boy(y) \wedge x \text{ fancied } y]$ is the same set regardless whether x stands for Betty or Wilma, and since f is a function, $f(\lambda y[boy(y) \wedge x \text{ fancied } y])$ is the same boy for either girl. Hence, (6) entails that any pair of girls who happened to fancy the same boys gave their flowers to the same boy, which is not a possible reading of (5).

Winter proposes to solve this problem by construing the choice function's argument intensionally: instead of applying to sets of boys, f applies to (intensional) properties of the form 'being a boy fancied by x', and since there are possible worlds, presumably, in which Betty and Wilma do not fancy the same boys, we can now differentiate between 'being a boy fancied by x' with x standing for Betty and 'being a boy fancied by x' with x standing for Wilma, even if in reality Betty and Wilma fancied the same boys. I have two objections to this proposal. First, it strikes me as implausible, because I fail to understand why intensional concepts should be crucially implicated in the interpretation of an apparently extensional construction. Second, even with intensional arguments for choice functions we will get wrong readings for sentences like the following:

(7) a. Every odd number is followed by an even number that is not equal to it.
b. $\exists f[CF(f) \wedge \forall x[odd\text{-}number(x) \rightarrow$
$f(\hat{}\lambda y[even\text{-}number(y) \wedge x \neq y]) \text{ follows } x]]$

The property of being an even number different from x is the same for any odd number x, and therefore one of the interpretations predicted for (7a) is that there is an even number that follows every odd number, which is incorrect.

Another possible way of trying to get around this problem is by adopting Kratzer's (1998) proposal to equip choice functions with extra arguments, to be bound by quantifiers occurring between the indefinite and the position where the choice function is introduced. This means, in other words, that we create a hybrid from choice functions and Skolem functions, which allows for (5) to be represented as follows:

(8) $\exists f[CF(f) \wedge \forall x[girl(x) \rightarrow$
$\quad x \text{ gave a flower to } f(x, \lambda y[boy(y) \wedge x \text{ fancied } y])]]$

Although (8) may be an adequate rendering of (5), this approach does not alleviate the trouble in any way. To begin with, it is not enough that we have a formalism in which sentences like (5) can be represented with the choice function variable being bound externally. Such representations must be derived in a principled way, and it is by no means obvious how that could be done. Second, even if choice functions are allowed to take further arguments, we do not want to force them to do so, because that would frustrate the proposed treatment of specific indefinites. For example, if (1a) were assigned the following representation, the indefinite NP *a German* would be construed, in effect, as having narrow scope:

(9) $\exists f[CF(f) \wedge \forall x[bicycle(x) \rightarrow f(x, German) \text{ stole } x]]$

But now we are back to square one; for even if (8) is a possible representation of (5), we still have not found a way of ruling out (6).

The reason why sentences like (5) cause trouble in the first place is the premise that indefinites must be interpreted in situ. If specificity is treated by means of movement, the problem does not even arise: moving (the semantic correlate of) the indefinite *a boy she fancied* to the left periphery will render it impossible for the universal quantifier to bind the pronoun—and that is all there is to it. Not only is this an adequate explanation obtained without ad hoc stipulations; it is also the most natural way of explaining how bound pronouns can obstruct a specific interpretation.

4 A Problem with Polarity

If *some* occurs within the syntactic scope of a negative expression, either the sentence may be construed as a denial, or the indefinite headed by *some* may receive a specific construal. With the negative polarity counterpart of *some,* in contrast, neither option is available, as witness:

(10) a. Wilma didn't see some gnus in her front garden.
b. Wilma didn't see any gnus in her front garden.
c. $\exists x[gnu(x) \wedge \neg [\text{Wilma saw } x \text{ in her front garden}]]$

(11) Wilma didn't see {SOME / *ANY} gnus in her front garden: she saw a whole herd!

Whereas (10a) can be read as (10c), with a specific reading of the indefinite object, (10b) affords only a narrow scope interpretation. And if *some gnus* in (10a) is interpreted in situ, the sentence can have only a marked denial reading, which is not available with *any,* as (11) illustrates. A movement analysis readily accounts for these observations. Since *some* is a positive polarity item, a *some*-NP that remains within the scope of a negative expression will have to have a marked interpretation, and if that is to be avoided, the indefinite must be moved out of the negative environment and thus receive a specific interpretation. *Any,* on the other hand, *requires* a negative environment and therefore cannot get a specific interpretation.

It is crucial to this explanation that indefinites be movable objects, so it is hard to see how it could be incorporated in a theory that insists that indefinites must always be interpreted in situ. But then it is something of a mystery how a choice function theory could ever account for the peculiarities of *some* and *any*.

5 An Attitude Problem

The statement in (12) has at least three distinct readings, which, in terms of scope, may be represented as in (13a–c).

(12) Bob believes that all sows were blighted by a witch.

(13) a. $\exists y[\text{witch}(y) \wedge \text{Bob believes: } \forall x[\text{sow}(x) \rightarrow y \text{ blighted } x]]$
b. $\text{Bob believes: } \exists y[\text{witch}(y) \wedge \forall x[\text{sow}(x) \rightarrow y \text{ blighted } x]]$
c. $\text{Bob believes: } \forall x[\text{sow}(x) \rightarrow \exists y[\text{witch}(y) \wedge y \text{ blighted } x]]$

(13a) and (13b) both require a specific reading of the indefinite *a witch.* Some people (not I) would say that, on the former reading, the speaker must have a particular witch in mind, whereas, on the latter reading, it is Bob who must have a particular witch in mind. In contrast to these two interpretations, the third reading, represented by (13c), allows for the possibility that, according to Bob, more than one witch was involved in the blighting of the sows. Let us focus on the first two readings and consider how they could be rendered in a choice function framework.

(14) a. $\exists f[\text{CF}(f) \wedge \text{Bob believes: } \forall x[\text{sow}(x) \rightarrow f(\text{witch}) \text{ blighted } x]]$
b. $\text{Bob believes: } \exists f[\text{CF}(f) \wedge \forall x[\text{sow}(x) \rightarrow f(\text{witch}) \text{ blighted } x]]$

Apart from the fact that (14a) and (14b) commit the speaker and Bob, respectively, to a belief in choice functions, which does not seem to be right, these representations cannot both be correct. If (14a) captures (13a), then (14b) does not capture (13b), and vice versa: if (14b) captures (13b), then (14a) does not capture (13a). For suppose that (14b) is correct. If this formula is true, on its intended interpretation, then it is Bob who believes that there is a witch; someone who utters (12) with this interpretation in mind does not commit himself or herself to this claim. But if this holds for (14b), then the same holds for (14a), for if the predicate *witch* is construed relative to Bob's doxastic state in one case, it should have the same construal in the other. This is not right, however: whereas (14b) should entail that Bob believes that there is at least one witch, (14a) should commit the speaker to this belief. Of course, if we start from the assumption that (14a) is correct, we obtain the mirror image of the preceding argument, so at least one of (14a) and (14b) is inadequate as it stands.

This problem arises because the intended distinction between (14a) and (14b) demands that the indefinite *a witch* be interpreted relative to different contexts. The most natural way of accomplishing this is by moving the indefinite to the context it belongs to, but this option is anathema to the choice function theorist. That being so, I can think of only one solution, which is admittedly clumsier than the movement analysis, but at least allows us to leave specific indefinites in place. We introduce a new inventory of indices for keeping track of contexts and key the interpretation of an indefinite to the appropriate context, for instance, by means of Peacocke's (1978) indexed actuality operator (which has been reinvented several times in the linguistic literature, e.g., by Kuroda (1981) and, more recently, by Farkas (1997)). Formally, this means that we trade in our standard intensional logic for a multidimensional intensional logic (note that two indices will not suffice because attitude reports can be embedded within each other), and (14a–b) give way to (15a–b).

(15) a. $[_0\ \exists f[\mathrm{CF}(f) \wedge \text{Bob believes: } [_1\ \forall x[\mathrm{sow}(x) \rightarrow$
$f(@\ _0(\mathrm{witch}))\ \text{blighted } x]]]]$
b. $[_0\ \text{Bob believes: } [_1\ \exists f[\mathrm{CF}(f) \wedge \forall x[\mathrm{sow}(x) \rightarrow$
$f(@\ _1(\mathrm{witch}))\ \text{blighted } x]]]]$

In (15a) the predicate *witch* is evaluated in the main context, and the choice function selects an individual that, according to the speaker, is a witch. In (15b), on the other hand, the predicate is evaluated relative to Bob's doxastic context, and the choice function selects an individual that is a witch in Bob's belief worlds.

This solution has an obvious drawback, however: it is inconsistent, if not with the letter, then certainly with the spirit of the requirement that indefinites be interpreted in situ. Granted, choice function theorists who embrace this approach may rightly claim to have a theory of specificity that does not involve movement, but they cannot pretend to have shown how to *interpret* specific indefinites in situ: although the predicate *witch* in (15a) may not have been moved, it is interpreted upstairs. So, apart from the fact that this approach entails considerable complications of a technical nature, it merely serves to keep up appearances.

6 Conclusion

The choice function theory is faced with a number of nontrivial problems, none of which arise if we adopt a movement theory, of one kind or another. So the least we can conclude is that, as matters currently stand, theories using choice functions are not a serious alternative to movement theories. But, furthermore, all the various objections raised in the foregoing point in the same direction, which is that the simplest and most natural way of dealing with specificity is by means of movement.

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