Counterfeeding, Derived Environment Effects, and Comparative Markedness[1]

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0   Introduction

One of the most interesting aspects of the Comparative Markedness (CM) theory is the unification of several phenomena traditionally thought to be unrelated. Grandfathering effects, Derived Environment Effects (DEEs), and counterfeeding opacity all turn out to be different facets of the same phenomenon, due to the presence of new and old markedness in the system.

DEEs are treated with the general ranking schema given in (1):

(1)   DEE ranking schema
       $_N M \gg \textsc{Faith} \gg {}_O M$

Since the faithfulness constraint is below the constraint militating against new marked segments, derived marked structures will be eliminated, while marked structures present in the input will remain intact. Counterfeeding opacity is handled by the opposite ranking.

(2)   Counterfeeding ranking schema
       $_O M \gg \textsc{Faith} \gg {}_N M$

Because only old marked structures are eliminated while new (derived) ones are preserved, the process driven by $_O M$ is counterfed by other processes.

As McCarthy points out (p. 51 and ff.), this analysis of DEEs and counterfeeding interaction differs sharply from most previous treatments in that the phenomena are understood as properties of whole grammars rather than specific processes. In other words, ranking such as (1) entails that all new marked structures punishable by $_N M$ will be eliminated, no matter what their source. Similarly, the ranking (2) suggests that if new structures violating $_N M$ arising from some process are tolerated, then such structures will be tolerated no matter what their source. These properties of CM can be summarized with the following slogans.

(3)   a. Once a DEE process, always a DEE process.
       b. Once counterfed, always counterfed.

Putting (1) and (2) together, we arrive at McCarthy's prediction, namely that counterfeeding and DEEs, being derived through opposite ranking schemata, are incompatible with each other: a process that is counterfed by another process cannot be subject to the Derived Environment Condition.

In the following sections I examine these predictions, arguing that despite the generality that CM brings to the theory, this unification of DEE and counterfeeding rule interaction is incorrect. I will show that it is the analysis of counterfeeding, not DEEs, that falls out of line with the facts, and will suggest a minor modification of the theory that, while limiting the scope of CM considerably, provides a tighter fit with the data.

1   Once a DEE process, always a DEE process

1.1   Latin Rhotacism

Latin Rhotacism is a classic case of a process subject to morphological DEE (see description in Allen and Greenough 1979, Sihler 1995: 172, and analysis in Kiparsky 1998). Intervocalic *s* is in general retained and pronounced as a voiceless fricative (Allen 1965), but in derived environments it changes to *r*.

(4)   a. *cau*[s]*a* 'reason'
           Mu[s]*a* 'Muse'
       b. /opes-is/ → *operis* 'work.GEN'
           /corpos-is/ → *corporis* 'body.GEN'

This indicates that the new markedness constraint $_N$*V*s*V must be undominated, while the old version of the same constraint must rank below faithfulness. The fact that voicing of *s* to *z* is not an option can be captured by the high-ranking *z*. Since this is a case of morphological DEE, the constraints refer to the FFC computed with respect to the OO faithfulness constraints, i.e. the FFCs for the two forms are the bases /opes/ and /causa/.

(5)

			*z	$_N$*V*s*V	ID[son]	ID[voi]	$_O$*V*s*V
/opes-is/		ope[s]is		*!			
		ope[z]is	*!			*	
	☞	ope[r]is			*	*	
/causa/	☞	cau[s]a					*
		cau[z]a	*!			*	
		cau[r]a			*!	*	

As is standard in CM analyses of the DEE, the diverging behavior of underlying and derived marked structures is due to the different ranking of the constraints $_N$M and $_O$M.

Now the prediction is that Rhotacism should apply any time an intervocalic *s* in an affixed form arises when the morphological base does not contain an intervocalic *s*. Consider the passive participles derived from coronal-final verb stems, such as *visus* 'seen' from /vid/, *ausus* 'dared' from /aud/, etc. The participial affix is *-t-us*, as can be seen in vowel-final stems such as *amatus* 'loved', from /ama/, *deletus* 'abolished', from /dele/, etc. In consonant-final stems, a process of cluster simplification derives *s* from the underlying cluster /dt/: /vid-t-us, aud-t-us/ → *visus*, *ausus*. The crucial fact here is that even though the *s* of *visus* is derived, it does not undergo Rhotacism.

These facts create a ranking paradox for the CM account. On the one hand, $_N$*V*s*V must outrank faithfulness in order to give the correct analysis for alternating stems such as /opes/. On the other

hand, $_N$*VsV must rank below faithfulness in order to prevent Rhotacism from applying to the derived s of *visus*. In other words, Rhotacism is a DEE process in some but not all morphological contexts.

1.2   Russian Velar Palatalization

Russian Palatalization is classic case of phonological DEE (Rubach 2000, Halle and Matushansky 2002, Blumenfeld 2003). Typically, sequences of non-palatalized [+back] consonants and the high front vowel *i* are prohibited: **pi*, **ki* are impossible, while *pʲi* and *kʲi* occur. This holds both within morphemes and across morpheme boundaries. However, the velar obstruents *k*, *g*, and *x*, when followed by *i* across certain morpheme boundaries, do not merely palatalize but surface as alveopalatals *č*, *ž* and *š*, respectively.

(6)   a. *pʲitʲ* 'drink'   **pitʲ*
          kʲistʲ 'brush'   **kistʲ*
      b. /lʲub-itʲ/ → *lʲubʲitʲ* 'love'   **lʲubitʲ*
          /mok-itʲ/ → *močitʲ* 'make damp' **mokʲitʲ*, **mokitʲ*

Thus, we have an undominated markedness constraint PAL-*i*, prohibiting C*i* sequences, and another markedness constraint, *K^j, militating against palatalized velars, whose new and old versions are ranked differently in the hierarchy.

(7)

			PAL-*i*	$_N$*K^j	ID[place]	ID[back]	$_O$*K^j
/mok-itʲ/		(FFC) mokitʲ	*!				
		mokʲitʲ		*!		*	
	☞	močitʲ			*	*	
/kʲistʲ/	☞	(FFC) kʲistʲ					*
		kistʲ	*!			*	
		čistʲ			*!		

CM predicts that *kʲ* will palatalize to *č* in all derived environments, not matter what the phonological process that gives rise to *kʲ*. In order to test this prediction, we need a process that creates palatalized velars out of something else. Since new markedness, $_N$*K^j, outranks faithfulness, CM predicts that all such velars will undergo Velar Palatalization (or possibly some other process) to repair the *K^j violation.

    It turns out that a number of processes creating palatalized velars exist in Russian. I will focus here on a process common in many dialects, known as Progressive Velar Softening (PVS; see Kasatkin 1962 for extensive documentation and discussion).[2] This process turns velars like *k* into palatalized velars like *kʲ* after palatalized consonants. This is exemplified in (8) below. I assume that these dialects do not differ in significant ways from the standard dialect in the analysis of Velar Palatalization.

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[2] Standard Russian has such processes too, exemplified by noun alternations such as *ruka* 'hand.NOM' ~ *rukʲi* 'hand.GEN'. I do not use this alternation as an example because of morphological complications.

(8) Standard Russian Dialects with PVS gloss
 a. *olʲ-k-a* *olʲ-kʲ-a* 'Olʲa.DIM'
    doč ʲ-k-a *doč ʲ-kʲ-a* 'daughter.DIM'
 b. *košol-k-a* *košol-k-a* 'purse.DIM'
    mam-k-a *mam-k-a* 'mom.DIM'

Note that palatalized velars that arise from PVS do not undergo Velar Palatalization, contra CM. The ranking needed for the data in (8) is ID[place] >> $_N$*Kʲ. This is illustrated by the tableau below, where the constraint AGREE, penalizing consonant cluster with conflicting [back] specifications, is the PVS-forcing constraint.

(9)

			AGREE	$_O$*Kʲ	ID[place]	ID[back]	$_N$*Kʲ
/olʲ-ka/		(FFC) olʲka	*!				
	☞	olʲkʲa				*	*
		olʲča			*!	*	

Thus, we have a ranking paradox: tableau (7) required the ranking $_N$*Kʲ >> ID[place], while tableau (9) calls for the opposite ranking. Once again, even though Velar Palatalization is once a DEE process, it is not always a DEE process.

2 Once counterfed, always counterfed

In his paper McCarthy supplied some potential counterexamples to this prediction from Arabic. Here I examine another facet of counterfeeding with reference to the same prediction.

   McCarthy discussed both morphological and phonological DEEs. Phonological DEEs arise when new and old markedness is evaluated relative to the FFC computed with reference to IO faithfulness, while morphological DEE is accounted for by evaluating markedness constraints relative to the FFC computed with reference to OO faithfulness. The consequence is that each markedness constraint exists in four versions: two input-output versions, IO-$_O$M and IO-$_N$M, and two output-output versions, OO-$_O$M and OO-$_N$M. This opens up the possibility that just as phonological DEEs have a morphological counterpart, counterfeeding opacity should also occur in a morphological version, analyzed with the ranking schema OO-$_O$M >> FAITH >> OO-$_N$M. The effect of this ranking would be that some marked structure would be eliminated in base forms (undominated old markedness) but tolerated across morpheme boundaries (low-ranking new markedness).[3]

   Such situations are in fact quite common, a welcome fact for CM. In Ancient Greek, clusters of two obstruent stops are admitted in non-derived environments only if the second stop is a coronal (Smyth 1956). Words like those in (10)a are possible, while hypothetical words like those in (10)b do not exist.

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[3] The offending structure would be tolerated across morpheme boundaries only if the constraint IO-$_O$M does not outrank faithfulness, since otherwise sequences spanning a morpheme boundary would violate the IO old markedness and would be eliminated.

(10) a. *tʰapto:* 'bury'   *okto:*   '8'
          pteryx 'bird'   *kte:ma*   'possession'
     b. **tʰapko:*   **okpo:*
          *pkeryx   **kpe:ma*

However, when clusters violating this generalization arise through concatenation of certain morphemes, e.g. the attachment of the prefix *ek-*, no alternation results.[4]

(11) /ek-teino:/   →   *ekteino:*   'stretch out'
      /ek-pipto:/   →   *ekpipto:*   'fall out'
      /ek-baino:/   →   *ekbaino:*   'walk out'

Given the distributional generalization illustrated in (10) and the lack of alternation in (11), the old markedness constraint, call it $_O$CLUSTERFORM, must rank above faithfulness, which must rank above the new markedness constraint $_N$CLUSTERFORM. No tableau should be necessary here. Note that this is a case of 'morphological counterfeeding': the prohibition against clusters with non-coronal second members is 'counterfed' by prefixation.

   CM, then, predicts that the phonotactic generalization will not only be counterfed by *ek-*prefixation but by ANY affixation potentially creating offending sequences. It turns out that Greek has just such a process: suffixation of *-k* in the Perfect.

(12)   /ke-komid-ka/ → *kekomika* 'I have provided'   cf. *komide:* 'provision'
        /pe-pʰrad-ka/ → *pepʰraka* 'I have told'   cf. *pepʰradon* 'I told' (epic)

As the forms in (12) show, when a cluster with a non-coronal second member arises across the stem-suffix boundary, the offending sequence is repaired by deleting the first stop of the cluster. The only way to analyze this fact in CM is to rank the new markedness constraint, $_N$CLUSTERFORM, above faithfulness—the opposite ranking from what is needed for *ek-*prefixation. In sum, a process once counterfed is not always counterfed.

3   A problem and a potential solution

3.1   Properties of counterfeeding in CM

The data discussed so far are relevant to the prediction of CM that DEE and counterfeeding are incompatible. For example, the Russian case involves just the type of situation predicted to be impossible in CM: a process that is subject to the DEE, Velar Palatalization, is counterfed by PVS. Latin Rhotacism, a process subject to the DEE, is counterfed by cluster simplification. In this section I show that what is problematic in each case is the analysis of counterfeeding. In the following section I will suggest a modification of the theory which may remedy the situation.

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[4] In the Homeric forms such as *kakkeiontes* /kat-keiontes/ 'lying down', participle of *katakeimai*, *kappese* /kat-pese/ 'fell down', aorist of *katapipto:*, this sequence is indeed eliminated by assimilation. I ignore these forms since they are limited to the Homeric dialect.

Recall that the CM analysis of counterfeeding posits a high-ranked old markedness constraint $_O$M. If this constraint is above faithfulness, the offending structures are actively eliminated from underlying representations, but if the new markedness constraint $_N$M is below faithfulness, marked structures arising in the course of derivation will be tolerated. This immediately leads to a new prediction of CM with respect to the type of process we might expect to be counterfed: because $_O$M affects the phonotactics of non-derived forms, the segments involved in the alternations driven by $_O$M must be non-contrastive. In other words, on the CM view, only allophonic processes can be counterfed. Finding counterexamples to this claim is not difficult. In Russian, where PVS counterfeeds Velar Palatalization, CM predicts that the segments involved in Velar Palatalization must be non-contrastive, which is clearly not the case, cf. *čem* 'what.INST' vs. *kʲem* 'who.INST'.

In Tangale, there is a counterfeeding relationship between vowel deletion and presonorant voicing (Kidda 1985). Normally, obstruents before sonorants undergo voicing, unless the two segments are separated by a vowel in the underlying representation that is eventually deleted. A derivational analysis is sketched below.

(13) 'my berry'   'my bag'
      /tugat-no/   /lútu-no/   SF
      tugadno   --   Presonorant voicing
        --   lútno   Vowel deletion
      tugadno   *lútno*   SF

This is a straightforward case of counterfeeding opacity. The old markedness constraint, $_O$*CR, prohibiting sequences of voiceless consonants and sonorants, ranks above the faithfulness constraint ID[voi], which in turn ranks above the new version of the same markedness constraint.

(14)

			DELETE-V	$_O$*CR	ID[voi]	$_N$*CR
/tugat-no/		(FFC) tugatno		*!		
	☞	tugadno			*	
/lútu-no/		(FFC) lútuno	*!			
	☞	lútno				*
		lúdno			*!	

The ranking $_O$*CR >> ID[voi] predicts that sequences like *tn* will be actively eliminated from underlying representations as well, which turns out not to be the case. There are many words in Tangale where a voiceless obstruent precedes a tautomorphemic sonorant: *pítlá* 'ant', *basre* 'work'. Thus, the process that is being counterfed by vowel deletion involves contrastive segments, contrary to the prediction of CM. In effect, given that presonorant voicing applies across morpheme boundaries but not inside morphemes, it is subject to the DEE, supplying another example where the CM prediction about the incompatibility of DEE and counterfeeding fails. It is counterfeeding, not the DEE whose analysis falls out of line.

Interestingly, the predictions of CM with respect to the relationship between contrast and counterfeeding are diametrically opposite of what one might expect in a classical *SPE*-style theory, or in a derivational or OT version of Lexical Phonology (Rubach 2000, Kiparsky to appear). In those theories, opacity arises through masking of the conditions of earlier rules by rules applying later in the derivation. Typically, a postlexical process will counterfeed a lexical or a cyclic one,

which leads to the expectation that it is impossible for an allophonic process to be counterfed by a structure-preserving one.

3.2   Is $_OM$ really necessary?

Given the otherwise impressive results of CM, how could the theory be salvaged to prevent the incorrect predictions it makes with respect to counterfeeding and its relationship to the DEE?

Since all of the problematic cases arise because of the ranking $_OM$ >> FAITH >> $_NM$, it makes sense to somehow render this ranking impossible. One way is to remove $_OM$ from the system altogether but reintroduce the general markedness, which penalizes BOTH old and new marked structures. In other words, each markedness constraint would exist in two versions, the standard M and the new markedness constraint $_NM$.

This move preserves the results of CM with respect to DEE and grandfathering effects, but makes it impossible to account for counterfeeding opacity, including iterative non-application. This result may not be unwelcome, since CM is an insufficient theory of opacity anyway—for instance, counterbleeding falls outside of its scope. It is worth noting that the same process in a language may counterfeed one process but counterbleed another, suggesting that it might not be appropriate to separate counterfeeding from other types of opacity. One example is from Ancient Greek: vowel contraction counterfeeds the rule *a: → e:* (15)a, but counterbleeds the accent placement rule (15)b which is computed on the underlying representation (see description in Smyth 1956, Sihler 1995). CM can deal only with the former but not the latter, while other theories of phonology, e.g. a serial theory, can make a connection between the two sets of facts: vowel contraction applies at a stratum that follows both accent placement and *a: → e:*.

(15) a. counterfeeding
>   'art'   'you.PL honor'
>   /tek^{h}n-a:/   /tima-ete/
>   tek^{h}n-e: --   a: → e:
>   --   tima:te   vowel contraction
>   *tek^{h}ne:*   *tima:te*

    b. counterbleeding
>   'human'   'you.PL honor'
>   /ant^{h}ro:pos/   /tima-ete/
>   ánt^{h}ro:pos   timáete   accent
>   --   timâ:te   vowel contraction
>   *ánt^{h}ro:pos*   *timâ:te*

The incorrect predictions discussed above disappear with the removal of old markedness. In addition, if opacity is handled by a serial theory of phonology, the prediction of CM summarized by the slogan (3)a will also no longer hold: a process subject to the DEE at one stratum in the grammar may not apply at another stratum. For example, such a theory would posit Russian Velar Palatalization to apply at the earliest level, while PVS and other processes creating palatalized velars would apply at a later point in the derivation.

4 Summary

I have examined several examples of DEE and counterfeeding in light of CM theory. It appears that the relationship between DEE and counterfeeding predicted to be impossible by CM is in fact commonplace across languages. Furthermore, the analysis of counterfeeding in CM makes a novel, and seemingly incorrect prediction regarding the relationship of counterfeeding to the phonotactics of underived forms. Modifications of CM that remove counterfeeding from the scope of the theory may be necessary to avoid these incorrect predictions while keeping the positive results of the theory intact.

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