METATHESIS IN ROTUMAN: A SPECIAL CASE OF COMPENSATORY LENGTHENING[i]

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The field of phonology has several competing proposals for how to formalize phonological "action." One school, OT, holds that all phonological generalizations are to be accounted for by means of surface oriented markedness constraints, faithfulness constraints, and a mysterious operator known as GEN. Among other insights, OT attempts to capture the apparent teleological and conspiratorial nature of phonological operations. On the other hand, derivational theorists point out that the architecture of their theory causes the optimologists to struggle unnecessarily with opacity, a commonplace phenomenon, as well as many other problems. A constraints and repair model, such as proposed by Calabrese 2005 and sketched in (1) on your handout, promises to capture the best of both theories.

In this talk I will show that a liberal interpretation of the Calabresean architecture, supplemented with a theory of phonological representation based on Raimy's 2000 proposals for phonological precedence, which in turn incorporates a theory of metrical structure along the lines of Halle and Idsardi 1995, offers some intriguing proposals for explaining the celebrated problem of Rotuman methathesis as a special case of the kind of Compensatory Lengthening illustrated in (2) on your handout, taken from Hayes 1989. Hayes reports that the change depicted in (2) is a typical Middle English sound change, where a (presumably stressed) penult vowel was lengthened just in case a word final schwa was dropped.

I will first illustrate my theoretical proposal by reference to the Middle English CL. I will walk you through the Constraints and Repairs model in (1) as I develop the CL example, and then turn to the Rotuman case.

The lexical representation of the form /tal∂/ is as shown in (3) on the handout. Observe that (3) contains the precedence relations explicitly marked, as in the Raimy framework. As shown, rudimentary metrical and syllable structure is supplied on line in the morphological component. Syllable structure is freely eliminated and reestablished after each operation that may affect syllable structure; metrical structure is immutable. This representation is now handed over to the phonology, so it becomes the INPUT to the model in (1).

All markedness constraints are in the module labeled "Markedness Statements" in (1); individual languages choose whether or not a given markedness statement is active, and if it is active it becomes an inviolable constraint in that language. The MS module evaluates each input representation in terms of each markedness statement, one by one in a specified checking order; Calabrese has this order partly universal and partly language

specific. If a representation fails on a given markedness statement, it is sent to the Repair Module, which contains sets of repairs. Each markedness statement is associated with a specific set of repair operations, and UG orders the operations within each repair set.

I propose that UG has a constraint against unmetrified vowels, which is marked as "active" in Middle English; I dub this constraint EVM, and it is (4) on the handout. This triggers the repair set unique to EVM, depicted in (5), which consists of two repair operations, to which we will turn in a moment. The procedure works as follows: /tal∂/ is stored as shown in the lexicon as depicted in (3). Rudimentary metrical and syllable structure is supplied as shown there. The representation with the metrical and syllable structure constitutes the input to the Markedness Module, where EVM marks it as illicit. It is therefore sent to the REPAIR set specific to that constraint, (5).

The first repair is (5i), the elimination of all the precedence relations to the right of the rightmost metrified vowel. Representations that contain elements that do not have precedence relations specified among them are uninterpretable by any component of the grammar; therefore, an optimization procedure is invoked to reestablish precedence relations. I show this optimization algorithm in (6) on your handout. It must apply within the Repair Module, because the Repair Module can produce only representations that are interpretable by the Markedness Statements.

I have depicted the optimization procedure in (6), as an OT-like tableau. The candidates evaluated constitute the entire set of ordering relations consistent with the structure which is the output of (5i). There are no candidates that have a metrical structure different from what you see in (5i), nor are there any with fewer or more phonemes; in other words, the candidate set is defined completely by supplying all the logically possible precedence relations consistent with the specification in (5i). As I mentioned a moment ago, I do assume that syllable structure is deleted and reassigned with each operation on the string of phonemes; I do not depict the resyllabification algorithm for reasons of space and time, but it think that it's totally straightforward.

As an aside, note that, despite the superficial resemblance to OT-style tableaux, the mechanism in (6) is really very different from an OT approach. For one thing, the number of candidates is severely limited. Plus, the constraints are inviolable, and therefore they are not rank ordered. In fact, the optimization process depicted here is similar to what's necessary to establish linearization in Precedence Theory, as suggested in some of the other papers at this conference, as well as in Fitzpatrick (to appear).

Candidate (a) in (6) is selected as the Candidate Revision for reconsideration by the Markedness Statements. Some languages have an active constraint prohibiting more than two segments in the Rime; Middle English marked this constraint as inactive, so the string produced by (5i) is accepted. I dub this constraint MAX2R, in (7) on your handout; we will see in a moment that this constraint is active in Rotuman. Because MAX2R is inactive in Middle English, the candidate revision (6a) passes muster according to EVM.

In a language in which MAX2R is active, the candidate revision (6a) would be marked as illicit in the MS module. The original input would then be sent back to undergo the second operation in the REPAIR, namely, (5ii), which would simply delete the unmetrified vowel. If this were to produce a candidate repair that satisfies all the active constraints in the Markedness Statements component, then it would emerge as the output and would be sent on to other modules.

The symbol /∂/ represents a vowel that does not have any melody associated with it; therefore, a sequence of a vowel followed by /∂/ is naturally interpreted by the phonetic component as a long vowel. Note that in Middle English, only /∂/ is deleted. This is presumably because this is the only phoneme that can appear in metrically weak position, by which I mean either not metrified at all or in the same metrical foot as a metrically stronger vowel. I propose a constraint and associated REPAIR offered by UG as shown in (8); this simply assures that only /∂/ is in unstressed position in English.

The preceding comments about /∂/ are relevant because an apparent "metathesis" of only /∂/ can lead to lengthening of the penultimate vowel. If a fully specified vowel were to undergo this process, then the "metathesis" would result in a diphthong, not a long vowel. This is what in fact happens in Rotuman, as I will show in a moment. But first let's summarize about CL in Middle English.

To summarize, note that the only three statements that the phonological grammar of Middle English needs to contain to account for CL are as shown in (9): EVM is active; *VMMW is active; MAX2R is inactive.

Note that I have used phrases like "apparent metathesis" to refer to my analysis of CL. This is metathesis in the sense that a set of operations reverses the ordering of two phonemes. However, this is an illusion; there is no specific mechanism that effectuates this reversal; it is simply the consequence of an operation in UG that deletes some precedence relations, followed by an operation that is required to produce well formed strings. With this caveat, it is convenient to use the term "metathesis."

Turning now to Rotuman, note that Rotuman metathesis differs from the CL example discussed above in two ways: First, it lacks the constraint against vowel melody appearing in metrically weak positions; as a result, a full vowel instead of /∂/ is "metathesized." In fact, Rotuman has no reduced vowels. Second, Rotuman has different syllable structure constraints than Middle English, with results that we will see in a moment. The essence of my proposal for Rotuman is that the metathesis is essentially the same as CL, only with the preservation of vowel color.

Before delving into the Rotuman example, some background about the language and scholarship on the language is in order. Rotuman is a Polynesian language with about 10,000 speakers. Its original home is the island of Rotuma, about 465 kilometers north of Fiji, its closest neighbor; more than two thirds of its speakers live in the Rotuman diaspora, mostly in Fiji, and also in other countries. Rotuman is very different in terms of both syntax and phonology from its closest linguistic and geographical neighbors. Churchward's 1940 seminal grammar and dictionary is the primary, but by no means the only, source of information on the language. A number of articles about the language and the phenomena that are the topic of today's talk have appeared in the theoretical

literature. All of these articles rely exclusively on Churchward. Sometimes Churchward's descriptions and insights do not fit the desires of the authors of these articles. In such cases, the authors have felt free to make their own interpretations.

A few years ago Marcel den Dikken and I team taught a course in the structure of Rotuman. In search of information, we simply googled Rotuma. We instantly learned that the language is alive and well. Its speakers are well educated as well as eager and competent to assist with responsible linguistic investigation of their language. We discovered a highly intelligent and educated young woman, Ms. Shalom Tua'toko, a native speaker of the language, as an employee of the United Nations here in New York. It turns out that not only is Churchward a totally reliable and quite insightful source, but also the language is much more interesting than the various fictions that have been spun about it in the theoretical literature.

Returning now to the main topic of this paper, all lexical items in Rotuman may appear in one of two forms, which have been referred to as "phases" since Churchward 1940; these are the "complete" (COM) and "incomplete" (INC). (This notion of "phase" is quite different from Chomsky's.) Words in the COM form appear only at the right edge of NPs which have an abstract clitic that is the marker of definiteness (den Dikken 2003). This clitic preserves the underlying form of the word. The INC form, which does not bear any morphosyntactic marker, is phonologically derived; under certain phonological conditions, this derivation involves apparent metathesis. Words in the INC form appear in nonfinal position in all phrases, and in final position of indefinite phrases. Some suffixes irregularly take the COM.

I have given an exhaustive list of all the differences between the COM and the INC in (10) on your handout. Limitations of space, time, and the focus of this paper clearly require that we discuss only very few of these; however, I thought they should be here in the interests of full disclosure. I am reasonably confident in the phonetic transcriptions here; I intend to create a web page in the near future in the CUNY Phonology Forum site that will contain the sound files, so you'll be able to check for yourselves.

I have adapted from den Dikken 2003 an illustration of the syntactic nature of the COM in (11) on your handout. I won't take the time to go over this in today's talk, except to note that this demonstrates the syntactic point I just made.

Turning now to the main point that metathesis is a special case of CL, observe first that one of the manifestations of the INC is metathesis, as we see in examples (1) – (8). Metathesis of the final vowel and last consonant occurs just in case the final vowel is lower than the penultimate vowel; the nature of the consonant is irrelevant. If the final vowel is not lower than the penultimate vowel, and if there is a consonant separating the final and penultimate vowels, then the final vowel deletes, as shown in examples (38) – (49); under certain circumstances, umlauting also occurs, as in examples (23) – (37). I will make a brief, highly speculative comment about umlauting in closing, but we will focus now on the cases of metathesis and vowel deletion. Observe also that if there is no consonant separating the final and penultimate vowels, as in examples (9) – (20), then one or the other vowel becomes a glide, under strict sonority conditions. This is easy to handle in this framework, although we won't have time to go into it today.

Recall that it is the COM forms that are morpho-syntactically marked, despite the fact that they appear phonologically unmarked, in the sense that they have unmarked

syllable structure. I mentioned a moment ago that the COM forms have an abstract clitic at their right edges. For convenience, I will use the dummy symbol "Q" to stand for this clitic. It is the function of Q to prevent the words to which it is cliticized from undergoing the cataclysmic changes we see in the INC; it is the unmarked state of affairs for Rotuman words to undergo these changes.

An examination of Rotuman metrical structure provides insight into this state of affairs. I propose that the phonological manifestation of Q is the addition of a bracket on the right edge of Line 0 of the metrical plane. When this bracket is not present, that is, in the INC forms, a final short vowel is extrametrical, triggering the repairs discussed in the first part of this paper. In the handout I have proposed a very tentative metrical analysis that accomplishes this result. It would take too much time in this talk to work through this. But the point is that it is the nature of our dummy symbol Q to prevent extrametricality in COM forms, whereas final short vowels are extrametrical in the absence of Q. Other and better metrical analyses are no doubt available, and I welcome hearing of them. But we have what we need now, so let's apply the ideas about CL to the Rotuman INC cases.

Rotuman, like Middle English, marks as active the constraint against unmetrified vowels, so the mechanisms we invoked to handle CL account for the metathesis in examples (1) through (7). Rotuman differs from English in that vowels with full melody are subject to this effect. Rotuman also differs from English in that it lacks reduced vowels at all; unstressed vowels are not reduced. Therefore, Rotuman marks as "inactive" the constraint I have dubbed *VMMW; vowel melody may appear in metrically weak positions in Rotuman. Therefore, it is expected that this apparent metathesis yields diphthongs in Rotuman, and not long vowels as in Middle English.

Recall that the mechanisms described above for CL do not allow for any changes on the metrical plane. Furthermore, we adopt the reasonable constraint that every syllabic nucleus must be associated with a mark on Line 0 of the metrical plane. Therefore, it follows that the originally final vowel and the penultimate vowel must crowd together into the same syllable. Considerations of time do not permit me to delve into the processes that convert the less sonorous of two tautosyllabic vowels into a glide, but it would be a straightforward account. I propose that in the metathesizing cases the glide is a member of the onset, not the rime. This is consistent with the observation that tautosyllabic glide – vowel sequences do not usually contribute to syllabic weight.

Let us now turn to the examples 38 – 49, where the final vowel is subject to deletion rather than metathesis. If the final vowel were to be metathesized in these cases, it would be either the same height or higher than the vowel with which it would be forced to share a syllable. This would force the once-final vowel to become either the second half of the vowel to its right or a glide. This would yield a representation where there would be three segments in the rime. Apparently Rotuman, unlike Middle English, has MAX2R marked as "active."

That is, the first REPAIR operation in (5i), plus the optimization sketched in (6), would yield a representation for any of the forms in 38 – 49 that would violate the active constraint MAX2R. The input representation would then get sent back to operated upon by (5ii), which deletes the unmetrified vowel.

Finally, a speculative – very speculative -- word about the umlauting cases – 23 – 37. Perhaps (5i) not only eliminates precedence relations, it also eliminates the association of all features from the two root nodes within its scope, the final vowel and the last consonant. According to this highly provisional hypothesis, if it is not possible for the final vowel to appear as a metathesized element, its frontness feature has lost its mooring, so to speak, because it has lost its association with its root node. This frees it up to associate to segments to its left; it spreads as far to the left as possible, obeying vowel harmony constraints sort of like those we see in Yokuts, where similarity in height is a necessary condition to vowel harmony.

To summarize, the apparently exotic nature of Rotuman metathesis may in fact be a straightforward manifestation of the processes that underlie common accounts of CL. Rotuman differs from Middle English minimally, in that it allows full vowel melody in metrically weak vowels, and it has different, although common, constraints on syllable structure.

I suggest that the proposed amalgamation of Calabrese's model, Raimy's theory, and the Halle Idsardi theory of metrical analysis is thereby shown to have promise. To my knowledge, no other combination of theoretical proposals allow for such a parsimonious analysis of these facts. Raimy's theory is particularly appropriate because it renders precedence relations formally explicit, and therefore open to scientific investigation. Precedence theory was originally put forth as a way of explaining reduplication phenomena, an area where the ordering of phonological elements is clearly a central issue. It is to be expected that its success in that domain would carry over into an understanding of metathesis, another area where ordering is key.

Calabrese's proposal for a constraints and repair model is also quite appropriate here. Clearly, the full range of the Rotuman phenomena depicted in (10) on your handout show a variety of mechanisms all oriented toward the "goal" of avoiding the pronunciation an unmetrified vowel. The operation of constraints in this model neatly captures this aspect of the phenomena. At the same time, a derivational model is clearly called for. There are interesting generalizations concerning vowel quality in Rotuman that are rendered opaque by the formation of the INC which I have not regaled you with. Calabrese's is the most successful theory that I know of that can give us the best of both worlds.

Finally, I want to stress that the foregoing proposal is much more of a promissory note than it is a final analysis. In order to justify the validity of the constraints proposed here and of the repair sets that are associated with them, it would be necessary to study the behavior of unmetrified vowels in many languages, as well as all the other work that would be necessary to justify the concrete proposals I have made for UG. The foregoing is therefore in the spirit of suggesting a program of research.

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