Opacity in Mojeño Trinitario Reduplication: A Harmonic Serialism Account

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1. Introduction: In Mojeño Trinitario (henceforth MT), an Arawak language spoken in Trinitario, Bolivia, reduplication interacts with rhythmic vowel deletion in an opaque way. Based on data from MT which has not been taken into consideration in reduplicative theory before, I argue for a Harmonic Serialism (henceforth HS) account of reduplication with standard constraints as they are also used in parallel Optimality Theory (henceforth OT, Prince & Smolensky 1993). Crucially, the standard faithfulness contraint MAXBR has the double function of triggering reduplication and protecting the reduplicant vowel from deletion later in the derivation. Whereas a HS system with standard constraints can fully account for the opacity in the MT reduplicative pattern, serial rule-based approaches to reduplication (e.g. Frampton 2009), standard parallel OT as well as HS with Serial Template Satisfaction (McCarthy et. al. 2012, henceforth STS) all fail to derive the pattern.

2. The data and its challenges:

(1)	*psop**po**x'konu*	(2)	*tkox'ma**ma**xi*
	pi-sopo-**po**-xi-'ko-nu		ti-ko-xu'ma-**ma**-xi
	2SG-believe-**RED**-CLF-ACT-1SG		3F-VZ-sickness-**RED**-CLF
	'You half-believe me.'		'She is sickly.' (Rose 2014)

Reduplication in MT expresses iteration or attuniation of the event expressed by the verb and copies the last syllable of the stem, attaching it to its right edge. Rhythmic vowel deletion applies to all underlying forms, deleting every second vowel starting with the first one (that is, all odd-numbered vowels are subject to deletion). Crucially, the vowel of the reduplicant is never deleted, even if it is odd-numbered, as in (2). The same holds for the word-final syllable. The stem vowel, however, is deleted transparently in case it is odd-numbered, as (1) shows. In such cases, base-reduplicant identity is violated. However, the reduplicant is not entirely invisible for vowel deletion: if it is odd-numbered and should technically be deleted, vowel deletion targets the next odd-numbered vowel instead, which in the schematized example (3) would be V_7 (cf. Rose 2014 for a detailed description).

(3) ~~CV$_1$~~.CV$_2$.(~~CV$_3$~~.CV$_4$)$_{Stem}$ - (~~CV$_5$~~)$_{RED}$ - CV$_6$.~~CV$_7$~~.CV$_{FIN}$.

If the reduplicant were completely invisible for vowel deletion, deletion would target V_6, since it would be the next odd-numbered vowel if RED was invisible for the deletion rule. Instead, V_7 is deleted, which implies that the vowel deletion rule can in fact "see" the reduplicant as part of the structure and shift the numbering of the vowels accordingly. This leads to a rule-ordering problem for serial rule-based accounts of reduplication (e.g. Frampton 2009) since no relative ordering of vowel deletion and reduplication can account for the pattern. Assuming the rule ordering *Reduplication >Vowel deletion*, the reduplicant vowel should be deleted transparently, whereas the ordering *Vowel deletion > Reduplication* predicts the vowel of the reduplicant to be completely invisible for vowel deletion and to not to shift the deletion of subsequent vowels.

3. An Implementation in HS: The standard approach to reduplication in HS involves STS (McCarthy et. al. 2012), in which reduplicative correspondence constraints are replaced by operations that copy strings of constituents. However, the lack of faithfulness constrains to protect the reduplicant from vowel deletion and the fact that base and reduplicant have no theoretical status in STS make it impossible to account for the pattern in MT. Ordering copying and vowel deletion relatively to each other without having faithfulness constraints to protect structure leads to the same rule-ordering conflict as in serial rule-based approaches. Instead, I will show that the standard theory of reduplication works better in HS and is able to derive the opacity in MT reduplication. Following Kager (1997), I interpret vowel deletion as reduction of vocalic features in weak vowels triggered by REDUCE. I assume left-aligned foot parsing into iambs; if the number of syllables is odd, the last foot is monosyllabic, which derives the fact that the final vowel is never deleted. Main stress is assigned to the rightmost foot, but can never fall on the final foot, which is reflected by ranking ¬FIN(F,ω) » RIGHTMOST (included in the cover constraint FTFORM). Following McCarthy (2016) I assume that syllabification does not require a seperate step in the derivation. The following tableau shows the step-by-step derivation of the reduplicated form in (2), where the reduplicant is expected to be deleted, but is preserved whatsoever.

/RED, ti-ko-xuma-xi/			¬FIN(F,ω)	RED=SYL	MAXBR	PARSESYL	REDFORM	FTFORM	REDUCE	MAXV-IO	ALLFTL
1a.		ti.ko.xu.ma.xi			∗∗∗!∗	∗∗∗∗∗					
1b.		(tikò)(xumá)(xì)			∗∗∗!∗			∗	∗∗		∗∗
1c.	☞	ti.ko.xu.ma.ma.xi			∗∗	∗∗∗∗∗∗					
1d.		ti.ko.xu.ma.xu.ma.xi		∗!		∗∗∗∗∗∗∗					
2a.	☞	(tikò)(xumá)(maxì)			∗∗				∗∗∗		∗∗
2b.		(tikò)(xumà)(maxí)	∗!		∗∗				∗∗∗		∗∗
2c.		(tikò)(xumá)ma(xì)			∗∗	∗!		∗!	∗∗∗		∗∗
2d.		ti.ko.xu.ma.ma.xi			∗∗	∗!∗∗∗∗∗					
3a.		(tikò)(xumá)(maxì)			∗∗				∗∗!∗		∗∗
3b.	☞	(t •kò)(x•má)(maxì)			∗∗				∗	∗∗	∗∗
3c.		(t•kò)(x•má)(m•xì)			∗∗∗!					∗∗∗	∗∗
3d.		(t•k•)(x•m•)(m•x•)			∗∗∗!					∗∗∗∗∗∗	∗∗

In the first step, reduplication takes place, triggered by a high-ranked MAX-BR constraint, and the material is parsed into syllables. The shape and position of the reduplicant is adjusted by the cover constraint REDFORM and the higher-ranked RED=SYL. The second operation, the input of which is (1c), parses the reduplicated form into left-aligned iambic metrical feet, assigning main stress to the second syllable of the penultimate foot. This is triggered by PARSESYL, which penalizes unparsed syllables. In the third step, REDUCE triggers the reduction of every weak (that is, first) syllable of a foot. It can only apply at this point because in the previous steps, the material had not yet been parsed into feet. Deletion of the reduplicant vowel is prevented by MAXBR, which by definition is violated when a feature in the base does not have a correspondent in the reduplicant (cf. Kager 1999). Reducing the vowel of the base thus does not violate MAXBR, but reducing the vowel of the reduplicant does. As a consequence candidate (3b) outranks candidate (3c). In the last step the derivation converges and the candidate with a non-reduced reduplicant vowel results as the winning candidate. This double role of MAXBR, namely triggering reduplication and protecting the reduplicant from deletion, works in HS, but not in the basic model of parallel OT (which is commonly used to account for reduplication, (McCarthy & Prince 1995)), since (basic) parallel OT does not involve an input-reduplicant faithfulness relation, so Constraints cannot refer to the correspondence between stem and reduplicant. In HS, this problem does not arise since reduplication and vowel deletion constitute two different steps which are ordered sequentially, so that vowel deletion can apply to an intermediate representation in which reduplication has already applied and stem-reduplicant correspondence is not necessary.

4. Conclusion: I have presented an opaque interaction of reduplication and vowel deletion in MT and proposed an analysis in HS making use of standard coinstraints, where vowel deletion is intrinsically ordered after reduplication. Crucially, the constraint triggering reduplication (MAXBR) at the same time protects the reduplicant vowel from being deleted in the third step. This double function of the standard constraint MAXBR cannot be achieved in (basic) parallel OT due to the lack of stem-reduplicant faithfulness. I have also argued against the concept of STS by showing that a standard faithfulness constraint is crucial in order to account for the preservation of the reduplicant vowel. Instead, my proposal is based on independent assumptions and standard constraints and does not need an additional system specific to reduplication. The analysis can sucessfully be extended to other languages in which vowel deletion underapplies in reduplicative forms, whereas other intents of accounting for this kind of opacity (Kimper 2007, Strujke 2000, Gouskova 2007) can only capture a subset of the data and fail to account for the opacity in MT.