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Emergence of the Unmarked in Ponapean Nasal Substitution[1]

Philip Spaelti

The Micronesian language Ponapean replaces certain consonants in clusters with a corresponding nasal. The occurrence of this phenomenon with coronals is restricted in two ways not seen with non-coronals: a limitation on the context to reduplication, and an identity requirement on the consonants of the cluster. Both of these restrictions are explained as the interaction of coronal unmarkedness with the Emergence of the Unmarked constraint ranking schema.

1. Introduction

Many languages group the consonants of their inventory into classes organized along the dimension of place. These classes behave as a unit for certain phonological effects. A well known case is that of Arabic/Semitic where consonants form groups with respect to certain restrictions on root shapes (McCarthy 1979, Pierrehumbert 1993). A recurring oddity is that while [m] and [ŋ] typically fall into the same group as [p] and [k] respectively, [n] forms a class with the coronal sonorants [r] and [l], and not with [t]. An example from an Austronesian language is seen in West Tarangan (Nivens 1992, 1993, Spaelti 1997). In this paper I look at a case from the Micronesian language Ponapean, that shows this patterning, but in a rather different context. I will argue that the cause is the same, namely that coronal supports more distinctions than the other places.

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2. Emergence of the Unmarked

In Optimality Theory (Prince & Smolensky 1993), phonology is seen as the result of the conflict between lexical stability—generally referred to as faithfulness (or Faith for short)—on the one hand, and markedness constraints on the other. The possible interactions can be represented by two basic schemata.

(1) Faith >> C_I

(2) C_A >> Faith

The schema in (1) represents a situation where the constraints regulating faithfulness are ranked above the markedness constraint C_I. Forms which contain a structure that violates C_I will be marked. However the higher ranked Faith prevents the marked structure form being changed or removed, and, all else being equal, forms which violate C_I will be present in the language. Thus C_I is generally inactive.

In (2) C_A outranks Faith. In this case, forms which avoid structures that violate C_A will always be preferred over forms that contain such structures. The low ranking of Faith means that even if we provide a form that contains such a structure, the structure will be modified in order to satisfy C_A. All else being equal the language will not contain such structures, and generally the constraint C_A is active.

As long as there is only a single dimension along which faithfulness is compared, then there will be only one choice from the possibilitites in (1) and (2), for any given constraint. However much recent work in phonology has been devoted to showing that there are in fact many different faithfulness dimensions. Work in this vein includes McCarthy & Prince 1994ab, 1995, Benua 1995, 1996, Itô & Mester 1995, 1997, Itô, Kitagawa & Mester 1996, Beckman 1995, 1997, among many others.

Once we admit more than one faithfulness dimension, then it becomes possible for a single markedness constraint to be involved in both types of ranking at the same time. This leads to the following ranking schema:

(3) Faith_1 >> C_E >> Faith_2

What this ranking says is that along the dimension regulated by Faith_1 forms containing a structure that violates C_E will be available, albeit marked. However when viewed along the dimension regulated by Faith_2 the markedness of such forms *emerges*, and forms containing such structures are avoided in favor of *unmarked* forms. In view of this we can call such a state of affairs *Emergence of the Unmarked* (or EoU for short).

McCarthy & Prince (1994a) first coined this term and used the ranking schema in (3) to account for such phonological behavior in the realm of reduplication. In reduplication the two relevant faith dimensions are those shown in (4) and (5).

(4) **Faith-LS** (or Faith-IO)
'the information contained in the lexical (or input) form must be faithfully preserved in the surface (or output) form.'

(5) **Faith-BR** (more precisely BR-Identity)
'the information contained in the base of reduplication must be faithfully copied by the reduplicant.'

Further work has since shown the importance of this ranking schema in many other domains such as output-output correspondence (paradigm uniformity), lexical strata, the relation of standard to secret language, and positional prominence, among others. In this paper however I will focus on a case involving reduplication, and the two Faith dimensions noted above.

The theory of EoU predicts that all kinds of markedness and prosodic restrictions should be possible emergent properties. A much discussed example of this kind is found in Ponapean. See for instance Itô (1986), Lombardi (1996).

The discussion of these facts here owes much to the presentation by Takano (1996), which first drew my attention to the EoU nature of this problem. In the end however, the analysis in Takano (1996) is not an EoU analysis, since it makes crucial reference to a 'templatic' constraint (R(ed)= ...). The same is true for Davis (1997) which is based on Takano (1996). (See Spaelti 1997 for arguments against the availablity of such constraints.)

Here I will review this case and show that it can indeed be accounted for relying on the mechanism of EoU alone. At the same time I will respond to certain criticisms in Davis (1997) of an earlier version of this analysis (see Spaelti 1997).

3. Ponapean Nasal Substitution and Coronal Clusters

The Micronesian language Ponapean has a pervasive form of consonant cluster adjustment known as 'Nasal Substitution' (Rehg & Sohl 1981). Nasal Substitution [henceforth also NS] turns homorganic consonant clusters that arise through affixation, reduplication, and even across words, into nasal/stop sequences.

A fact that has been puzzling to previous analyses is that not all such clusters behave the same in all contexts. While labials and dorsals undergo Nasal Substitution in all contexts, clusters of coronals only do so when they arise through reduplication.

(6)	pap	pampap	'to swim' (p. 75)
	p^wap^w	$p^wam^wp^wap^w$	'to fall' (p. 75)
	kik	kiŋkik	'to kick' (p. 75)
	tot	tontot	'frequent' (p. 75)
	sis	sinsis	'to speak with an accent' (p. 75)
	cac	cancac	'to writhe' (p. 75)

Example (6) shows some typical reduplication data. While reduplication in Ponapean varies considerably in shape, longer examples show that only the first few segments are ever reduplicated. Thus the reduplication can be considered prefixing, making the first part the reduplicant, and the second part the base. Throughout this paper I have adopted the practice of underlining the reduplicant.

As (6) shows, whenever two identical obstruents are juxtaposed due to reduplication, the first obstruent dissimilates to a nasal. For example *pap* 'swim', if reduplicated faithfully, would result in the form **pappap*. This form would have a geminate *p* where the final *p* of the reduplicant falls next to the initial *p* of the base. In this case the first *p* is replaced with the corresponding nasal *m*. This type of change occurs with coronals and non-coronals alike.

A similar type of change is seen with liquids. Liquids turn into nasals when reduplication causes them to immediately precede a coronal obstruent. Examples of this kind are shown in (7).

(7)	til	tintil	'to penetrate' (p. 75)
	tar	tantar	'to strike, of a fish' (p. 75)
	sar	sansar	'to fade' (p. 75)
	cal	cancal	'to make a click-like sound' (p. 75)

When a form such as *til* 'to penetrate' reduplicates we would expect the result to be **tiltil*, where the reduplicant ends in the coronal sonorant *l*. However since the following segment *t* is also coronal, the *l* is replaced with a coronal nasal *n*.

In non-reduplicative contexts the effects of Nasal Substitution are limited to clusters involving non-coronals. With dorsals and labials Nasal Substitution occurs even when the clusters arise due to affixation, or across words. Examples of this kind are seen in (8). This happens even if the two consonants are not identical, just as long as they share the same place of articulation.

(8)	/sap^{w} + paa/	sa**m**paa	'world earth' (p. 62)
	/ɛp + p^{w}ɔtol/	ɛ**m**^{w}p^{w}ɔtol	'a game' (p. 62)
	/kɛɛp + m^{w}ɔt/	kɛɛ**m**^{w}m^{w}ɔt	'variety of yam' (p. 62)
	/witɛk + ki/	witɛ**ŋ**ki	'to be poured with'
	/ɛ saik + kɛŋwini/	ɛ sai**ŋ**kɛŋwini	'he hasn't yet taken his medicine' (p. 62)

Opposed to this is the behavior of coronals. If a coronal cluster is due to affixation no Nasal Substitution occurs. Since Ponapean does not tolerate such clusters however it resolves the situation with one of the many forms of epenthesis available to the language.

(9)	/m^{w}oot + to/	m^{w}oo**t**o**t**o	'sit here' (p. 64)
	/wɛit + ta/	wɛi**t**i**t**a	'proceed upward' (p. 63)
	/pɔt + ti/	pɔ**t**ɛ**t**i	'plant downward' (p. 63)
	/m^{w}ɛsɛl + saŋ/	m^{w}ɛsɛlisaŋ	'leave from' (p. 63)

So far we have seen NS in two different cases: NS in reduplication and NS in affixation. The first case occurs only between identical obstruents, or between two coronals where the first is a sonorant and the second an obstruent.

The second case occurs between any two non-coronals sharing the same place of articulation.

One point that needs to be clarified is the question whether these two cases, Nasal Substitution in reduplication, and Nasal Substitution elsewhere, are both just sub-cases of the same phenomenon, or whether they should be treated separately. For instance both Rehg & Sohl (1981) and Lombardi (1996) argue that two rules of Nasal Substitution are necessary, since they have different conditions imposed on them. On the other hand Itô (1986) treats both types as the result of a single rule of NS, and attributes the differing affect to the unmarkedness of coronals. The analysis developed here will show that a proper understanding of coronal unmarkedness leads to a solution.

The difference in conditioning that leads previous analyses to posit two rules is that while the NS seen in (8) occurs with any CC clusters with identical place of articulation, the NS seen in reduplication would seem to require complete identity of the two consonants. However what little evidence there is, suggests that, while for clusters involving coronal obstruents complete identity *is* required, in the case of dorsal and labial clusters, NS in reduplication only requires identical place of articulation.

(10)	$m^w op^w$	$m^w om^w m^w op^w$	$*m^w op^w m^w op^w$	'to be out of breath' (p. 75)
	sɛt	sɛtɛsɛt	*sɛnsɛt	'artificially ripen breadfruit (p. 61)'
	lus	lusulus	*lunlus	'jump' (p. 61)
	net	netinet	*nennet	'smell'

As seen in (10) the form $m^w om^w m^w op^w$ 'to be out of breath (reduplicated)' the reduplicant final p^w undergoes NS even though the following consonant is not identical, but only shares the same place. On the other hand in the case of coronals the data show that mere place identity is not sufficient to trigger NS. Particularly striking is the contrast between $m^w om^w m^w op^w$ and *netinet* 'smell'. In both cases we have a reduplicant which would potentially end in an oral stop, i.e. p^w and *t* respectively, followed by a base with an initial nasal stop at the same place of articulation, i.e. m^w and *n*. Nevertheless only the labial cluster undergoes NS, while the coronal cluster is broken up by epenthesis. This shows that only perfect identity leads to NS in the case of coronal obstruents.

This observation leads to a solution of the mystery of why coronals only undergo Nasal Substitution in reduplication contexts, but not in general. The distinction would seem to have to do with the well known cross-linguistic tendency for coronals to support more distinctions than the other places of articulation (McCarthy & Taub 1992). This is true in Ponapean as well where dorsal and labial place only know a nasal/non-nasal distinction,[2] while coronal place admits distinctions for [continuant] and [anterior]/ [distributed], and also contrasts three coronal sonorants. The inventory of Ponapean is shown in the following chart.

(11) **Consonant Inventory of Ponapean**

	labial	*coronal*			*dorsal*
		dental		*retroflex*	
stop	p, p^w	t		c	k
continuant			s		
nasal	m, m^w	n			ŋ
liquids		l	r		

Considering this inventory Nasal Substitution in the case of labials and dorsals is 'recoverable' in a way that is clearly not the case with coronal consonants.

[2]There is actually one further distinction possible in the case of labials, which have a contrast between velarized and plain forms. Such 'secondary' fe atures are often disregarded for identity considerations (see discussion in Mester 1986).

For instance an [ŋŋ] cluster could only be the NS outome of an underlying [kŋ] cluster. On the other hand if NS occurred freely in coronal clusters, [nn] could potentially be the result of any one of the following clusters: [tn], [sn], [cn], [ln], or [rn]. This reflects the point that has already been made earlier, namely that coronal supports more distinctions than do dorsal and labial. In a language like Ponapean, the grammar will need to be sensitive to distinctions among coronals, while in the case of labials and dorsals the mere specification of place is enough. This is particularly true of obstruents, a point to which I will return. Important for our purposes, I would claim, is that this sensitivity explains why coronals require identity in order to be able to undergo NS, while labials and dorsals do not.

P&S, and Smolensky (1993), show how this richness of inventory can be attributed to coronal unmarkedness. The crucial ingredient in Optimality Theoretic terms is a *universal markedness scale*, which is represented by the fixed ranking hierarchy, shown below.

(12) *Place/Dorsal, *Place/Labial >> *Place/Coronal

The hierarchy in (12) expresses two ideas. First of all it represents the fact that a dorsal or labial place specification is more marked than a coronal one. But also, and this point will be important below, it represents the markedness of the place specification itself. In other words we can understand *Place/Dorsal as saying 'avoid a dorsal gesture', and *Place/Coronal as the same for coronals. The higher priority given to the avoidance of dorsal gestures makes coronal gestures less marked.

One point that is true about Ponapean, and is almost certainly universal among languages, is that all three types of gesture are found. This means no underlying segment is ever changed or dropped *for the sole reason* that it contains one of these gestures. Thus the constraints that require faithful realization of segments and their place specification, Max-LS and Ident(Place)-LS respectively, will both be ranked above the hierarchy in (12), leading to the following overall ranking.

(13) Max-LS, Ident(Place)-LS
>> *Place/Dorsal, *Place/Labial
>> *Place/Coronal

It is not the case that a language that contains the ranking in (13), which I claim includes all known languages, cannot delete segments or change their place of articulation. However such deletion or change will need to be mandated by some other constraint, which in turn will need to be ranked above either Max-LS or

Ident(Place)-LS. For instance, Ponapean does not permit NC clusters which do not share place, and the only other types of consonant clusters permitted are geminate sonorants. These restrictions can be accounted for by assuming a restriction on word internal coda consonants (see Itô 1986 for discussion). The constraint or constraints which enforce this are undominated, since there are no surface forms that violate them in Ponapean.

And it is these coda restrictions which are responsible for Nasal Substitution. As was seen in the data sets earlier, NS occurs whenever two consonants would come together in a cluster. Such clusters are ruled out by the coda restriction, and the resolution of this structure into the form of a homorganic NC cluster leads to one of the few types of clusters permitted in the language. The main alternative to NS, epenthesis, also successfully circumvents the coda restriction.

We can now move on to the analysis. Nasal Substitution involves a change in feature of the relevant segments, in this case, at least the feature nasal. Since the nasal feature is obviously contrastive in Ponapean, it will generally be important to realize this feature faithfully. The constraint that ensures this is Ident(nasal)-LS.

(14) **Ident(nasal)-LS**
'corresponding elements in underlying (L) and surface form (S) have identical values for nasal'

Nasal Substitution, which changes a consonant into the corresponding nasal violates this constraint. On the other hand, it creates NC clusters, which are an admissible type of consonant cluster. As a result, it permits the two consonants to remain adjacent, which simplifies the articulation. The two consonants can be realized as a single gesture, while resolving the cluster by means of epenthesis would require two. Assuming that the markedness of the gesture is represented by the *Place/... constraints, we have a conflict between these constraints, and the requirement to faithfully realize the nasal value of the segment, i.e. Ident(nasal)-LS.

(15)

/witɛk + ki/	*Pl/Dor	Id(nas)-LS
a. ☞ witɛŋki	*	*
b. witɛkiki	**!	

This tableau shows the evaluation of the form *witeŋki* 'to be poured with'. This form results from combining the stem *witek* 'pour' with the instrumental suffix *ki*. Simple concatenation would result in a form **witekki*, which would contain a dorsal cluster. Such clusters violate the coda restriction of the language as

discussed earlier, and are never optimal. I have chosen not to include such candidates, and instead consider only candidates which have resolved the cluster. In this case the solution is Nasal Substitution, and from this we can conclude that the constraint *Place/Dorsal which penalizes dorsal gestures must outweigh Ident(nasal)-LS.

The next tableau shows the case of a coronal cluster due to affixation. In this case the relative unmarkedness of the coronal articulation, compared with the markedness of changing the nasality of the segment, means that epenthesis will be the preferred solution. This means that the constraint *Place/Coronal must be ranked below Ident(nasal)-LS. The overall ranking that results from the two ranking arguments, is shown in (17). This ranking is perfectly in accord with the fixed ranking in (12)/(13).

(16)

/wɛit + ta/	Id(nas)-LS	*Pl/Cor	Dep-LS
a. wɛinta	*!	*	
b. ☞ wɛitita		**	*

(17) *Pl/Dorsal, *Pl/Labial >> Ident(nasal)-LS >> *Pl/Coronal

Tableau (16) shows the evaluation for the form *weitita* 'proceed upward'. In addition to providing the ranking argument for (17), it also demonstrates that Ident(nasal)-LS must outrank Dep-LS, the constraint that prohibits epenthesis. Otherwise NS would always be preferred to epenthesis as a way of resolving impermissible clusters.

The ranking in (17) constitutes the basic analysis of NS in affixed forms. Once we combine this ranking with the one shown in (13), we make a further prediction: NS with dorsals and labials will happen only when the following consonant has the same place of articulation. This is so, since only in that case will the fusion of the two articulations preserve the original place specification. The requirement that a segment keep its place is mandated by Ident(Place)-LS, and as the discussion in connection with (13) revealed, this constraint must outrank the place markedness constraint hierarchy, or Ponapean wouldn't have any consonants!

(18)

/katik + ta/	Id(Pl)-LS	*Pl/Dor	Id(nas)-LS
a. katinta	*!	*	*
b. ☞ katikata		**	

This tableau shows how Ident(Place)-LS prevents Nasal Substitution from occurring with segments that do not share the same place specification. The

example is the form *katikata* 'to get bitter', where the stem *katik-*, ending in a dorsal, is suffixed with the directional suffix *-ta* 'upward', that has an initial coronal. Candidates **katikta*, which results from simple concatentation, and **katiŋta*, which retains the stem final dorsal, but changes it to the corresponding nasal, include consonant clusters which violate the Ponapean syllable canon, and therefore they cannot be optimal. This leaves only the candidates seen in (18) as serious contenders. The form **katinta* replaces the impermissible cluster with an acceptable NC cluster, and in doing so improves its score with respect to *Place/Dorsal. But by changing the stem final dorsal to a coronal it violates Ident(Place)-LS and thus loses to the candidate which resolves the cluster by epenthesis.

Turning next to reduplication, it is here that we see the Emergence of the Unmarked ranking in effect. The important contrast between reduplication and affixation was seen in the behavior of coronals. While in affixation coronal clusters require epenthesis, in reduplication, clusters of identical coronal obstruents are resolved by NS. The analysis for affixation presented in (16) was driven by the need to faithfully realize the nasal feature, which prevented coronal clusters from undergoing NS. Since in reduplication at least some coronal clusters can undergo NS as well, we can conclude that the necessity to faithfully realize the nasality of a segment is much lower. The constraint responsible for the faithful realization of nasality in affixation was Ident(nasal)-LS, in (14). The corresponding constraint for reduplication is shown below.

(19) **Ident(nasal)-BR**
'corresponding elements in the base (B) and the reduplicant (R) have identical values for nasal'

With this constraint in hand we can move on to the analysis. Example (20) shows the tableau for the reduplicated form of *tot* 'frequent' which contains a cluster of identical coronals.

(20)

/RED + tot/	Id(nas)-LS	*Pl/Cor	Id(nas)-BR
a. ☞ tontot		***	*
b. totitot		****!	

This tableau shows the typical Emergence of the Unmarked configuration. Since reduplication is involved we have two different faithfulness dimensions, represented by the two constraints Ident(nasal)-LS and Ident(nasal)-BR. Since there are two faithfulness dimensions, each can interact with the same markedness constraint independently, and this is what we see in this case. While clusters

of identical coronals due to affixation are resolved by epenthesis, as was seen in (16), in reduplication, such clusters undergo NS as seen here in (20).

Note however that the greater complexity of coronals has consequences. If following Padgett (1995) we assume that the place node is the locus for the specification of [continuant], then [s] and [t] for example cannot be seen as having identical place specifications. At the same time Rehg & Sohl (1981) point out that while [t] is dental [s] is produced further back. Thus also in terms of the actual place of articulation the two consonants can be seen to differ. The same is true for the third coronal obstruent [c], which is described as a retroflex affricate, and thereby differs from both [t] and [s] in both its place and in the specification for continuancy.

But if [t] and [s] have different place specifications, then having a [ts] cluster undergo NS and becoming a single coronal gesture will mean that one of the two place specifications will be lost. But this will lead to a violation of the higher ranked Ident(Place) constraint discussed in connection with (13) above. Thus non-identical coronal obstruents cannot undergo Nasal Substitution, even if they come together as a result of reduplication. The tableau for an example of this type is shown below.

(21)

/RED + sɛt/	Id(Pl)	Id(nas)-LS	*Pl/Cor	Id(nas)-BR
a. sɛnsɛt	*!		***	*
b. ☞ sɛtɛsɛt			****	

(21) shows the tableau for the form sɛtɛsɛt 'artificially ripen breadfruit (redup.)'. A monosyllabic reduplicant for this form would lead to a [ts] cluster, which is impossible in Ponapean. However replacing the cluster with a homorganic [ns] cluster would violate Ident(Place) as discussed above. Thus epenthesis is the result.

4. On the behavior of coronal sonorants

The account developed has successfully accounted for the behavior of coronal obstruents and non-coronals in reduplication and affixation. In particular it was argued that coronals can only undergo NS if their exact place specification is identical to that of the following consonant. This point would seem to be contradicted by the behavior of coronal sonorants, which can become nasal before any coronal. The following list shows the outcome of all possible coronal clusters.

(22)

		C_2					
		t	*s*	*c*	*n*	*l*	*r*
C_1	*t*	nt					
	s		ns				
	c			nc			
	n	nt	ns	nc	nn	ll	rr
	l	nt	ns	nc	nn	ll	rr
	r	nt	ns	nc	nn	ll	rr

Table (22) shows the output realization of underlying coronal CC clusters. The rows show clusters with identical first consonant (C_1) and the columns group clusters with the same second consonant (C_2). Clusters which undergo NS are indicated by the corresponding NC cluster, while blank spots are for clusters which undergo epenthesis. The shaded area highlights the clusters which show total assimilation. Since total assimilation is limited to liquids (the nasal cases can be attributed to NS) Rehg & Sohl (1981) call this 'liquid assimilation'. It should be noted that this table represents an idealization of the facts, since not all clusters are attested in the data.

There are two asymmetries evident in this table. The first has to do with the quality of C_1. If C_1 is an obstruent it will require complete identity to undergo NS, while if it is a sonorant it will nasalize before any coronal. A literal understanding of the analysis developed previously might lead one to conclude that the analysis has reached an impasse. Either coronal sonorants require Ident(Place) to be low ranked, in contrast to the claims made in connection with (13) and (20), or we must conclude that sonorants have the same place as all the other coronals, which would be a self-contradiction since I argued earlier that the coronal obstruents have different place specifications.

The second asymmetry has to do with directionality. Since in the general case [t] can undergo NS, and sonorants can undergo NS before [t] we should conclude that [t] should also show NS (or liquid assimilation) when it appears before sonorant coronals. This would seem to follow since all of the constraints involved were symmetric (except the coda condition). A typical datum relevant to this point is the form *netinet* from *net* 'smell' by reduplication. Since [nt] is a possible cluster in Ponapean, [n] and [t] must be homorganic. Thus changing [t] to [n] should not violate Ident(Place) and indeed it does not in the form *tontot*. Thus the naive expectation is that NS should be possible in the case of 'smell' leading to the unattested **nennet*.

However I would like to claim that the analysis developed so far can be retained largely unchanged, and that an explanation of this apparent paradox

follows from a proper understanding of the role played by contrast. I have argued throughout this paper that the different behavior of different consonants is due to the uneven distribution of consonants in the inventory. Thus the large number of distinctions among coronals means that the language will be sensitive to such distinctions, while the small number of contrasts among labials will mean that the language treats all labials as one group.

The same is true even within the class of coronals. among coronals the exact place/gesture specification is crucial to the identity of obstruents, but not to that of sonorants. This means that sonorants are not subject to the same strict requirements set by Ident(Place). Support for this point comes from assimilation.

As noted by Rehg & Sohl (1981) coronal sonorants in Ponapean, more specifically [n], assimilate to the exact place of a following obstruent. Thus before [s], [n] is further back than before [t].

A proposal that would address these points might be the following. Rather than assume a single constraint Ident(place), we can replace it as follows:

(23) a. Ident(articulator)

b. Ident(release quality)[−son] >> Ident(release quality)

The constraint in (23a) requires identity of what might be called the 'primary place'. I have chosen to rename it in order to separate this constraint from the discussion of dependent features. Thus all coronals will be treated as alike by this constraint, since they all involve the coronal articulator.

The constraints in (23b) represent a family of constraints with a fixed ranking. These constraints focus on the identity of the secondary place features as well. I have chosen a formulation in terms of release, since it brings out more directly the motivation for the fixed ranking. Obstruents typically have release as their most important, or only accoustic cue. Thus they are more sensitive to its accurate realization.

Turning now to the issue of directionality. It is well known that assimilation is asymmetrical. Typically nasals (and other sonorants) assimilate to stops, not the other way around. This is related to the point just discussed in connection with the formulation of the constraints in (23), since obstruents depend on the formant structure of the release for determining the quality.

In contrast in the case of sonorants, the sonorant noise resulting form a lowered velum or a lateral opening obscures the formant structure of the release.

More specifically, we can now account for the contrast between *tontot* with NS on the one hand, and *netinet* with epenthesis on the other, simply in terms

of the constraint hierarchy in (23b). In the case of NS between two identical consonants, even though the first is changed to a nasal consonant, it still has a release expressed through the stop. Since the consonants are identical, the release is identical as well.

(24)

/RED + tot/	Id(RQ)[−son]	*Pl/Cor	Id(nas)-BR
a. ☞ tontot		***	*
b. totitot		****!	

In the case of an obstruent followed by a nasal, joining the two to form a single gesture with only one release will mean that the quality of the release will not be that of an oral stop. Thus NS will not be possible in this case.

(25)

/RED + net/	Id(RQ)[−son]	*Pl/Cor	Id(nas)-BR
a. nennet	*!	***	*
b. ☞ netinet		****	

5. Conclusion

This paper has discussed Nasal Substitution in Ponapean, a segmental change which affects consonant clusters created through affixation. NS behaves differently in reduplication and in non-reduplicative affixation, with reduplication NS targeting a larger set of segments. It was shown that this difference can be attributed to Emergence of the Unmarked, a well documented fact of reduplicative life (Steriade 1988, McCarthy & Prince 1994, 1995, Alderete et al. 1996, Spaelti 1997). Under this assumption the different affect of NS in reduplication follows directly from the theory of reduplication. This is in contrast to other analyses which must stipulate that reduplication is involved.

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