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Progressive Place Assimilation in Optimality Theory

by

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Thesis

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Abstract

This thesis presents an investigation into progressive place agreement in word-medial clusters through the lens of Optimality Theory (Prince & Smolensky, 1993/2004; McCarthy & Prince, 1995, 1999). A large typology of such languages is presented and examined to detail a broad swath of phenomena. The main line of inquiry over this typology is how direction of assimilation is formally represented. This work argues that simple phonological mechanisms explain the cross-linguistic effects including an agreement constraint and conflicting faithfulness constraints.

Table of Contents

List of Tables

List of Tableaux

Chapter 1: Place Assimilation as Agreement

1.1 Introduction

Place assimilation is overwhelmingly regressive i.e., codas are more likely than onsets to be the targets of assimilation cross- and intra-linguistically (Webb, 1982; Jun, 1995, 2004, inter alia). Because progressive assimilation is rare (and even thought not to exist (Webb, 1982, p. 317)), most previous typological research on place assimilation has focused on regressive place assimilation. Regressive place assimilation has been analyzed in a number of ways that often exclude progressive assimilation as a possibility. This thesis expands the typology of progressive place assimilation and argues that these systems delimit the available analyses. Directionality is argued to result from conflicting faithfulness constraints in an Optimality Theoretic framework (Prince & Smolensky, 1993/2004; McCarthy & Prince, 1995, 1999).

This chapter establishes the framework and main claim of the thesis. Section 1.2 outlines Optimality Theory and the main constraints considered throughout. Section 1.3 demonstrates the application of this analysis on regressive and progressive place assimilation. Section 1.4 outlines the remainder of the thesis.

1.2 Optimality Theory

This work analyzes direction of place assimilation as resulting from conflicting demands mapping input forms onto outputs. Optimality Theory (Prince & Smolensky, 1993/2004; McCarthy & Prince, 1995, 1999) provides a constraint-based framework that models phonological alternations as the interaction of conflicting demands on the output via markedness constraints and those on inter-domain mapping (primarily input-output mappings in this work) via faithfulness constraints. As such and because it provides a concrete model of typology, Optimality Theory is an ideal scaffolding for this work. This section introduces and defines the core constraint set used throughout this work with additional constraints defined in the text as needed.

1.2.1 Relevant constraints. This section overviews the constraints that are necessary for the analyses throughout the thesis. They are broken up into markedness constraints, i.e., constraints that restrict the potential output of a given candidate, and faithfulness constraints, i.e., constraints that restrict the potential differences between an input and its candidates.

1.2.1.1 Markedness constraints. Markedness constraints are violated by candidates with particular properties. Active in a grammar, markedness constraints restrict the possible output for a given input. The main markedness constraint used in this thesis, AGREE(PLACE), compels adjacent segments in the output to be specified for the same place feature (Lombardi, 1999; Baković, 2000). This constraint can be formally defined as in (1) below.

(1) AGREE(PLACE) [1] Assign one violation mark for every pair of adjacent consonants whose members differ in their specification for place.

Informally, this constraint is violated by heterorganic consonant clusters and satisfied by homorganic consonant clusters (as well as vacuously satisfied by singleton consonants). Because markedness constraints evaluate potential output candidates independently of their input, AGREE(PLACE) can be satisfied by either regressive or progressive place assimilation (as well as vacuously by breaking up consonant clusters). This is shown in Tableau 1.

[1] Shortened in tableaux to AGREE(PL)

Tableau 1: AGREE(PLACE)

/V$C_{Pl:\alpha}C_{Pl:\beta}$V/	AGREE(PL)
a. [V$C_{Pl:\alpha}C_{Pl:\beta}$V]	*!
b. [V$C_{Pl:\alpha}C_{Pl:\alpha}$V]	
c. [V$C_{Pl:\beta}C_{Pl:\beta}$V]	

Tableau 1 demonstrates the evaluation of candidates by AGREE(PLACE). The input contains a heterorganic consonant cluster whose members are specified abstractly with α place and β place features where α is different from β. The fully faithful candidate (1a) violates AGREE(PLACE) because it contains a heterorganic consonant cluster. The unfaithful candidates (1b) and (1c) satisfy AGREE(PLACE) by containing only homorganic clusters. Note that in candidate (1b), the second consonant has assimilated to the first and in candidate (1c), the first consonant has assimilated to the second. While AGREE(PLACE) prefers these unfaithful candidates over the faithful candidate, it cannot distinguish between them. Determining which unfaithful candidate is optimal is the responsibility of the faithfulness constraints.

1.2.1.2 Faithfulness constraints. Faithfulness constraints are violated by properties in the input that are different in the output. Active in a grammar, faithfulness constraints act to preserve the input as much as possible. As this thesis is focused on place assimilation, the main faithfulness constraints are those that act to preserve place features. These constraints pattern together as part of a family; they preserve place features generally or under specific circumstances. The most general constraint is IDENT(PLACE) which is violated whenever a place feature in the input is different from its corresponding place feature in the output (McCarthy & Prince, 1995, p. 16). This constraint can be defined formally as in (2).

(2) IDENT(PLACE)[2] Assign one violation mark for every place feature in the input that is different from its corresponding place feature in the output.

Informally, this constraint is violated when a place feature changes from input to output. When ranked above AGREE(PLACE), heterorganic clusters are tolerated. This results from the violation of faithfulness outranking the violation of markedness. When ranked below AGREE(PLACE), heterorganic clusters are not tolerated and place assimilation can act to repair the markedness violation. This is shown in Tableau 2 below.

Tableau 2: AGREE(PLACE) >> IDENT(PLACE)

/V$C_{Pl:\alpha}C_{Pl:\beta}$V/	AGREE(PL)	IDENT(PL)
a. [V$C_{Pl:\alpha}C_{Pl:\beta}$V]	*!	
b. [V$C_{Pl:\alpha}C_{Pl:\alpha}$V]		*
c. [V$C_{Pl:\beta}C_{Pl:\beta}$V]		*

Tableau 2 is an extension of Tableau 1; the only difference being the inclusion of IDENT(PLACE). As in Tableau 1, the fully faithful candidate (2a) is ruled out by its high-ranked violation of AGREE(PLACE). This leaves the unfaithful candidates (2b) and (2c) for further evaluation. Candidates (2b) and (2c) each violate IDENT(PLACE). Candidate (2b) does so by changing the place feature of its second segment from /β/ to [α]. Candidate (2c) violates IDENT(PLACE) by changing the place feature of its first segment from /α/ to [β]. It is important to note that IDENT(PLACE) by virtue of being equally violated by candidates (2b) and (2c) is as impotent as

[2] Shortened in tableaux to IDENT(PL)

AGREE(PLACE) in determining which direction of assimilation is optimal. The ranking given in Tableau 2 compels place agreement via place assimilation and nothing else.

Directionality is determined by the remaining set of faithfulness constraints. These constraints are all specific versions of IDENT(PLACE); whereas IDENT(PLACE) is violated by any place feature changing from input to output, these constraints are only violated by certain place features changing such as a place feature in a morphological root. Place assimilation is either regressive, targeting the first consonant in a cluster, or progressive, targeting the second consonant in a cluster. If one of the consonants has a specific property that the other consonant does not, preserving its place features may be asymmetrically preferred by one of these specific faithfulness constraints. The interaction of these constraints thereby determines the optimal direction of assimilation. There are three such properties that figure largely in this thesis: position in the syllable, morphological status, and manner of articulation.[3]

When a consonant cluster straddles a syllable boundary, the first consonant occupies the coda position of the first syllable while the second consonant occupies the onset of the second syllable. Features associated with onsets have been shown to realize more faithfully than features associated with codas; this is formalized as positional faithfulness (Beckman, 1998). The relevant positionally faithful constraint, IDENT(PLACE)$_{\text{ONSET}}$, is violated when place features associated with a syllable onset in a candidate differ from corresponding place features in the input.[4] This constraint can be defined formally as in (3).

[3] There is a fourth property relating to the underlying place feature that is discussed in Chapter 3, though the evidence for it is less compelling than the three included here.
[4] I follow Prince & Smolensky (1993/2004) in assuming underlying forms are not syllabified.

(3) IDENT(PLACE)$_{ONSET}$[5] Assign one violation mark for every place feature in the input that is different from its corresponding place feature in the output if the output correspondent occupies the onset of a syllable.

Informally, this constraint is violated when place assimilation targets the onset of a syllable. Note that candidates that violate IDENT(PLACE)$_{ONSET}$ also violate IDENT(PLACE), the former assigning violations to a subset of the latter. Subset relations such as this have a special property in Optimality Theory. If two candidates are tied, the candidate satisfying the subset sensitive constraint will beat the candidate violating it regardless of the relative ranking of the subset sensitive constraint. The candidate with a proper subset of violations is said to *harmonically bound* the other candidate, which can never be chosen as optimal. Introducing a syllable boundary into the example given in Tableau 1 and Tableau 2 demonstrates the effect of positional faithfulness, as shown in Tableau 3 below.

Tableau 3: AGREE(PLACE) >> IDENT(PLACE), IDENT(PLACE)$_{ONSET}$

/V$C_{Pl:\alpha}C_{Pl:\beta}$V/	AGREE(PL)	IDENT(PL)	IDENT(PL)$_{ONSET}$
a. [V$C_{Pl:\alpha}$.$C_{Pl:\beta}$V]	*!		
b. [V$C_{Pl:\alpha}$.$C_{Pl:\alpha}$V]		*	*!
☞ c. [V$C_{Pl:\beta}$.$C_{Pl:\beta}$V]		*	

As in Tableau 1 and Tableau 2, the fully faithful candidate (3a) is ruled out by its fatal violation of AGREE(PLACE). By introducing a syllable boundary into the tableau, indicated by the period between the consonants, the violations of (3b) and (3c) are no longer indentical. Candidate (3b)

[5] Shortened in tableaux as IDENT(PL)$_{ONSET}$

targets an onset for place assimilation thereby incurring a violation of IDENT(PLACE)$_{ONSET}$. Because candidate (3c) satisfies this constraint by targeting a coda for place assimilation, it is chosen as optimal. Thus, regressive directionality is optimal for this ranking.

Positional faithfulness always prefers that a coda consonant is targeted over an onset consonant. As noted above, ceterus paribus it guarantees regressive assimilation is optimal. This pressure can be understood to be the basis of the typological tendency for languages to target codas for place assimilation. This tendency can be expressed as the implication universal "if the onset is a target of place assimilation, so is the coda" (Jun, 1995, p. 76). Thus, an analysis of place assimilation in Optimality Theory should not predict grammars wherein progressive place assimilation is possible but regressive place assimilation is impossible. The role of positional faithfulness as a tie-breaker accords this tendency with the analysis presented here. As will be shown below, IDENT(PLACE)$_{ONSET}$ can become inactive when dominated by conflicting constraints, but its presence prevents pathological phonologies which only allow progressive assimilation.

Another subset sensitive faithfulness candidate acts to prevent place features in the morphological root from undergoing assimilation. The constraint, IDENT(PLACE)$_{B/O}$, is violated when place features in the root are targeted for place assimilation (McCarthy & Prince, 1995). It can formally defined as in (4) below.

(4) IDENT(PLACE)$_{B/O}$[6] Assign one violation mark for every place feature in the input that is different from its corresponding place feature in the output if the feature belongs to the morphological root.

[6] Shortened in tableaux as IDENT(PL)$_{B/O}$

Informally, this constraint prefers assimilation to target features in affixes instead of those in roots. Note that whereas positional faithfulness always prefers regressive assimilation, the preference of directionality of morphological faithfulness depends on the configuration of morphemes. Across a prefix-root boundary, IDENT(PLACE)$_{B/O}$ prefers regressive assimilation because the coda happens to be in an affix. Across a root-suffix boundary, however, this constraint prefers progressive assimilation because the coda happens to be in the root. This is shown in Tableau 4 below.

Tableau 4: AGREE(PLACE) >> IDENT(PLACE), IDENT(PLACE)$_{B/O}$

/V$C_{Pl:\beta}$|$C_{Pl:\alpha}$V$C_{Pl:\alpha}$|$C_{Pl:\beta}$V/	AGREE(PL)	IDENT(PL)	IDENT(PL)$_{B/O}$
a. [V$C_{Pl:\beta}$|$C_{Pl:\alpha}$V$C_{Pl:\alpha}$|$C_{Pl:\beta}$V]	*!*		
b. [V$C_{Pl:\beta}$|$C_{Pl:\beta}$V$C_{Pl:\beta}$|$C_{Pl:\beta}$V]		**	*!*
☞ c. [V$C_{Pl:\alpha}$|$C_{Pl:\alpha}$V$C_{Pl:\alpha}$|$C_{Pl:\alpha}$V]		**	

In Tableau 4, the morphological root is indicated as the syllable within vertical lines; syllable boundaries are not marked. The fully faithful candidate (4a) incurs two violations of AGREE(PLACE) and is ruled out. There are two unfaithful candidates considered in the tableau, though there are logically more. Candidates (4b) and (4c) each violate IDENT(PLACE) twice. Because candidate (4b) targets the segments in the root for assimilation, it incurs an additional two violations of IDENT(PLACE)$_{B/O}$. Candidate (4c) targets the segments in the affixes for assimilation and satisfies morphological faithfulness. Therefore, candidate (4c) is chosen as optimal. Note that in candidate (4c) there is an instance of regressive assimilation at the prefix-root boundary and an instance of progressive assimilation at the root-suffix boundary. For this bidirectionality to hold, IDENT(PLACE)$_{B/O}$ must dominate IDENT(PLACE)$_{ONSET}$ so that positional faithfulness cannot override the directionality at the root-suffix boundary.

The third faithfulness constraint imposes an asymmetry between two subsets of consonants instead of a subset-whole asymmetry as with positional and morphological faithfulness. Manner faithfulness imposes a fixed relationship between obstruents and nasals such that faithfulness to an obstruent is always more harmonic than faithfulness to a nasal: IDENT(PLACE)$_{OBSTRUENT}$[7] >> IDENT(PLACE)$_{NASAL}$[8] (Jun, 1995, 2004). The version of these constraints presented here differs from their original definition. The constraints were originally defined by their position in relation to following consonants as PRES(PL(STOP C)) >> PRES(PL(NASAL C)) where PRES is short for *preserve* and can be thought of as identical to IDENT. The constraints presented here abstract away from their position before a consonant segment but are formally equivalent. The formal definitions of these constraints are as above mutatis mutandis. Like morphological faithfulness, the preferred direction of assimilation depends on the nature of the input. Obstruents being more faithful than nasals, in nasal-obstruent clusters, regressive assimilation targeting the nasal is preferred. In obstruent-nasal clusters, however, progressive assimilation targeting the nasal is preferred. This is shown in Tableau 5 below.

Tableau 5: AGREE(PLACE) >> IDENT(PLACE), IDENT(PLACE)$_{OBSTRUENT}$ >> IDENT(PLACE)$_{NASAL}$

/V$N_{Pl:\beta}O_{Pl:\alpha}VO_{Pl:\alpha}N_{Pl:\beta}$V/	AGREE(PL)	IDENT(PL)	IDENT(PL)$_{OBS}$	IDENT(PL)$_{NAS}$
a. [V$N_{Pl:\beta}O_{Pl:\alpha}VO_{Pl:\alpha}N_{Pl:\beta}$V]	*!*			
b. [V$N_{Pl:\beta}O_{Pl:\beta}VO_{Pl:\beta}N_{Pl:\beta}$V]		**	*!*	
☞ c. [V$N_{Pl:\alpha}O_{Pl:\alpha}VO_{Pl:\alpha}N_{Pl:\alpha}$V]		**		**

[7] Shortened in tableaux to IDENT(PL)$_{OBS}$
[8] Shortened in tableaux to IDENT(PL)$_{NAS}$

In Tableau 5, nasals are represented as N, obstruents as O. The tableau is exactly like Tableau 4 wherein the inner segments are protected by additional faithfulness. In the winning candidate (5c) both nasals have been targeted for assimilation resulting in both regressive and progressive assimilation. As with morphological faithfulness, for progressive assimilation to be possible, IDENT(PLACE)$_{\text{OBSTRUENT}}$ must dominate IDENT(PLACE)$_{\text{ONSET}}$, thus forcing the assimilation of a nasal in onset position to protect the obstruent in coda position.

A summary of the constraints is given in Table 1 below.

Table 1: Summary of constraints

Constraint	Type	Effect
AGREE(PLACE)	Markedness	Prevents heterorganic clusters from surfacing
IDENT(PLACE)	Faithfulness	Prevents changing place features
IDENT(PLACE)$_{\text{ONSET}}$	Faithfulness	Prevents changing place features in onsets
IDENT(PLACE)$_{\text{B/O}}$	Faithfulness	Prevents changing place features in roots
IDENT(PLACE)$_{\text{OBSTRUENT}}$	Faithfulness	Prevents changing place features of obstruents
IDENT(PLACE)$_{\text{NASAL}}$	Faithfulness	Prevents changing place features of nasals (universally dominated by IDENT(PLACE)$_{\text{OBSTRUENT}}$

Having laid out the core constraints used throughout this thesis, the following section demonstrates how their interaction determines direction of assimilation.

1.3 Direction of Assimilation

The interaction of conflicting faithfulness constraints determines direction of assimilation. Undominated, positional faithfulness prefers regressive place assimilation as in

Diola Fogny (shown in section 1.3.1). However, when a conflicting faithfulness constraint such as morphological faithfulness as in Musey dominates positional faithfulness, progressive place assimilation becomes optimal (shown in section 1.3.2).

1.3.1 Regressive assimilation. The well-studied Diola Fogny (Niger-Congo) presents regressive place assimilation across morpheme boundaries; nasal consonants in coda position undergo place assimilation to following nasals and stops (Sapir, 1965). Table 2 below provides representative examples.

Table 2: Diola Fogny nasal place assimilation

	Underlying Form	Surface Form	Gloss
a.	/ni-gam-gam/	[ni.gaŋ.gam]	"I judge"
b.	/pan-ɟi-maɲj/	[paɲ.ɟi.ma.ɲj]	"you (plural) will know"
c.	/ku-bɔɲ-bɔɲ/	[ku.bɔm.bɔɲ]	"they sent"
d.	/na-ti:ŋ-ti:ŋ/	[na.ti:n.ti:ŋ]	"he cut (it) through"
e.	/na-mi:n-mi:n/	[na.mi:m.mi:n]	"he cut (with a knife)"

As the data in Table 2 above demonstrate, nasals in coda position assimilate to the place of the following consonant in onset position. For example, the underlying /m/ in the reduplicated /gam/ surfaces with velar place as [ni.gaŋ.gam] "I judge" (2a), having assimilated to the following velar /g/. This process robustly targets nasals at every place of articulation.[9] Assimilation in Diola Fogny is sensitive to the manner of the target coda; while nasals undergo place

[9] Cf. assimilation systems like that of Korean in which coronals assimilate to labials and velars, labials assimilate to velars but not to coronals, and velars resist assimilation completely (Jun, 1995, 2004).

assimilation, stops do not. When two stops are concatenated by the morphology, the underlying stop in coda position does not surface. Table 3 below gives representative examples.

Table 3: Diola Fogny stop deletion

	Underlying Form	Surface Form	Gloss
a.	/lɛt-ku-ɟaw/	[lɛ.ku.ɟaw]	“they won’t go”
b.	/uɟuk-ɟa/	[u.ɟu.ɟa]	“if you see”
c.	/kob-kob-en/	[ko.ko.ben]	“yearn, long for”

As the data in Table 3 demonstrate, in heterosyllabic stop-stop clusters only the consonant in onset position surfaces. For example, the underlying /bk/ cluster surfaces only as [k] in [ko.ko.ben] “yearn, long for” (3c), the underlying /b/ having deleted. Generally, heterorganic clusters in Diola Fogny do not surface faithfully. If the consonant in coda position is a nasal, it undergoes place assimilation to the following onset. Otherwise, if the consonant in coda position is a stop, it deletes.

Because both deletion and place assimilation repair heterorganic clusters in Diola Fogny, AGREE(PLACE) must dominate both MAX and IDENT(PLACE). IDENT(PLACE) assesses unfaithfulness to place features of nasals and stops equivalently. Because nasals and stops pattern differently with respect to assimilation and deletion, an Optimality Theoretic analysis must appeal to the manner-sensitive constraints IDENT(PLACE)$_{OBSTRUENT}$ and IDENT(PLACE)$_{NASAL}$ with the former in a fixed ranking above the latter. Ranking IDENT(PLACE)$_{NASAL}$ below MAX derives the preference of assimilation of nasals over their deletion. Ranking MAX below

IDENT(PLACE)$_{OBSTRUENT}$ derives the preference of deletion of stops over their assimilation. Tableau 6 below demonstrates this ranking for [ni.gaŋ.gam] "I judge" (2a).

Tableau 6: /ni-gam-gam/ > [ni.gaŋ.gam] in Diola Fogny

/ni-gam-gam/	AGREE(PL)	IDENT(PL)$_{OBS}$	MAX	IDENT(PL)	IDENT(PL)$_{NAS}$
a. [ni.gam.gam]	*!				
☞ b. [ni.gaŋ.gam]				*	*
c. [ni.gam.bam]		*!		*	
d. [ni.ga.gam]			*!		

The fully faithful candidate [ni.gam.gam] (6a) contains a heterorganic cluster and therefore fatally violates AGREE(PLACE). Because IDENT(PLACE)$_{OBSTRUENT}$ dominates IDENT(PLACE)$_{NASAL}$, the unfaithful candidate that targets the stop for assimilation [ni.gam.bam] (6c) is less optimal than the winning candidate [ni.gaŋ.gam] (6b) which targets the nasal for assimilation. The unfaithful candidate in which a segment deletes, [ni.ga.gam] (6d), is ruled out because MAX dominates IDENT(PLACE). Thus, despite IDENT(PLACE) preferring deletion, it is not optimal.

In Tableau 6, direction of assimilation was determined by an asymmetry between stops and nasals. Progressive assimilation was ruled out because it targeted a stop while the candidate with regressive assimilation targeted a nasal. When such an asymmetry is not present, as is the case when two nasals concatenate, this analysis does not predict which direction of assimilation will be optimal. Appealing to positional faithfulness correctly predicts regressive assimilation will win over progressive assimilation. Tableau 7 demonstrates this ranking for [na.mi:m.mi:n] "he cut (with a knife)" (2e).

Tableau 7: /na-mi:n-mi:n/ > [na.mi:m.mi:n] in Diola Fogny[10]

/na-mi:n-mi:n/	AGREE(PL)	MAX	IDENT(PL)	IDENT(PL)NAS	IDENT(PL)ONSET
a. [na.mi:n.mi:n]	*!				
☞ b. [na.mi:m.mi:n]			*	*	
c. [na.mi:n.ni:n]			*	*	*!
d. [na.mi:.mi:n]		*!			

As in Tableau 6, AGREE(PLACE) and MAX rule out the fully faithful candidate [na.mi:n.mi:n] (7a) and the unfaithful candidate in which a segment has deleted [na.mi:.mi:n] (7d) respectively. The unfaithful candidates in which the heterorganic cluster has been repaired by targeting a nasal for assimilation, (7b) and (7c), tie with respect to IDENT(PLACE) and IDENT(PLACE)$_{NASAL}$. Because [na.mi:n.ni:n] (7c) targets an onset for assimilation, it incurs an additional violation of IDENT(PLACE)$_{ONSET}$ that [na.mi:m.mi:n] (7b), which targets a coda for assimilation, does not. It is this additional violation that favors regressive assimilation over progressive assimilation. Furthermore, because IDENT(PLACE)$_{ONSET}$ is only active over tied candidates, it can occupy any position in the ranking.

The analysis thus far therefore handles nasals in coda position. We turn now to stops in coda position. Tableau 8 demonstrates the ranking for [ko.ko.ben] “yearn, long for” (3c).

[10] Because there are no obstruents in this derivation, IDENT(PLACE)$_{OBSTRUENT}$ is excluded from the tableau to save space.

Tableau 8: /kob-kob-en/ > [ko.ko.ben] in Diola Fogny[11]

/kob-kob-en/	AGREE(PL)	IDENT(PL)$_{OBS}$	MAX	IDENT(PL)	MAX$_{ONSET}$
a. [kob.ko.ben]	*!				
b. [kog.ko.ben]		*!		*	
c. [kob.po.ben]		*!		*	
☞ d. [ko.ko.ben]			*		
e. [ko.bo.ben]			*		*!

The fully faithful candidate [kob.ko.ben] (8a) contains a heterorganic cluster and fatally violates AGREE(PLACE). The two unfaithful candidates in which a stop is targeted for assimilation, [kog.ko.ben] (8b) and [kob.po.ben] (8c), lose to [ko.ko.ben] (8d) because IDENT(PLACE)$_{OBSTRUENT}$ dominates MAX. As in Tableau 7, MAX alone cannot determine which stop should be deleted. MAX violated equally by [ko.ko.ben] (8d) in which the coda deletes and [ko.bo.ben] (8e) in which the onset deletes. Thus, including the positional faithfulness constraint MAX$_{ONSET}$ correctly targets the coda when there is no other difference between the consonants.

With rare exception, heterosyllabic clusters in Diola Fogny are limited to nasal-obstruent and nasal-nasal clusters. In the case of nasal-obstruent clusters, asymmetrical manner faithfulness limits assimilation to regressive assimilation targeting the nasal. In the case of nasal-nasal clusters and underlying stop-stop clusters, positional faithfulness favors targeting the coda over the onset, choosing regressive assimilation or deletion over progressive assimilation or deletion. Were obstruent-nasal clusters to occur in Diola Fogny, ranking IDENT(PLACE)$_{ONSET}$

[11] Because there are no nasals in this derivation, IDENT(PLACE)$_{NASAL}$ is excluded from the tableau to save space.

above IDENT(PLACE)$_{\text{OBSTRUENT}}$ would derive regressive assimilation. Thus, this analysis ensures regressive assimilation without predicting progressive assimilation in Diola Fogny.

1.3.2 Progressive assimilation. Musey (Chadic) presents progressive place assimilation at root-enclitic junctures; consonants in initial position of the enclitic undergo place assimilation to the final consonant of the host root (Shryock, 1996). These initial consonants surface faithfully when host roots end in vowels, glides, and /ɾ/.[12] The cognate masculine and feminine enclitics /-na/ and /-ta/ in the related Masa language show similar allomorphy (Shryock, 1997; Antonino, 1999). Table 4 below gives the surface forms of these enclitics in Musey after vowel-final roots.

Table 4: Musey enclitics attached to vowel-final roots

	-na masculine	-da feminine	-ɗɪ negative	-kɪyo[13] intensifier
V_	sana “person”	goonɪɾa “hyena”	kaɗɪ “exist”	toogɪyo “sweep”

Attached to roots that end with nasals and stops, these enclitics progressively assimilate to form homorganic clusters. Table 5 gives relevant examples.

[12] The underlying /d/ of /-da/ surfaces as [ɾ] intervocalically.
[13] The underlying form of this enclitic is analyzed with an initial voiceless stop /k/, but this is not clear from the data as this segment only surfaces as voiceless after other voiceless segments. Nevertheless, I follow Shryock’s (1996) phonemic analysis and treat the surface [g] as the result of intervocalic and post-sonorant voicing.

Table 5: Musey enclitics attached to stop- and nasal-final roots

	-na masculine	-da feminine	-ɗı negative	-kıyo intensifier
p_	hapma “white”	happa “gruel”	salappı “weave”	loppıyo “fatigue”
t_	butna “ashes”	votta “road”	ndattı “she”	duttıyo “pick fruit”
k_	sulukŋa “vengeance”	tokka “meeting”	sukkı “strength”	ʧokkıyo “stab”
m_	semma “foot”	kolomba “mouse”	kulumbı “horse”	humbıyo “hear”
n_	vunna “mouth”	mununda “spirit of water”	sundı “work”	fendıyo “blow one’s nose”
ŋ_	zoŋŋa “young man”	goŋga “slave”	ʔeŋgı “strength”	galaŋgıyo “shake”

The data in Table 5 above demonstrate robust progressive assimilation of the initial consonant of the enclitics. For example, the underlying coronal /n/ of the masculine enclitic /-na/ surfaces with labial place after a labial stop as in [hapma] “white” and after a labial nasal as in [semma] “foot.” Likewise, the underlying velar /k/ of the intensifier enclitic /-kıyo/ surfaces with coronal place after a coronal stop as in [duttıyo] “pick fruit” and after a coronal nasal as in [fendıyo] “blow one’s nose.” Generally, the initial consonant of the enclitic surfaces homorganic to the final consonant of the host root.

Because place assimilation occurs in Musey, an Optimality Theoretic analysis of the data must include the ranking AGREE(PLACE) >> IDENT(PLACE). To motivate the asymmetrical faithfulness between consonants in enclitics and those in roots, the analysis appeals to IDENT(PLACE)$_{B/O}$. Because this constraint imposes a stringency relation between roots and enclitics (i.e. being unfaithful to a root harmonically bounds being unfaithful to an enclitic), it does not need to be ranked relative to AGREE(PLACE) and IDENT(PLACE). Tableau 9 below demonstrates this ranking for [kolomba] "mouse."

Tableau 9: /kolom-da/ > [kolomba] in Musey (1)

/kolom-da/	AGREE(PL)	IDENT(PL)	IDENT(PL)$_{B/O}$
a. [kolomda]	*!		
b. [kolonda]		*	*!
☞ c. [kolomba]		*	

The fully faithful candidate [kolomda] (9a) contains a heterorganic cluster and therefore fatally violates AGREE(PLACE). The two unfaithful candidates [kolonda] (9b) and [kolomba] (9c) each violate IDENT(PLACE) once; it is the additional violation of IDENT(PLACE)$_{B/O}$ by [kolonda] (9b) that makes [kolomba] (9c) the optimal candidate.

While IDENT(PLACE)$_{B/O}$ prefers [kolomba] (9c) over [kolonda] (9b) in Tableau 9 above, [kolomba] (9c) is dispreferred by other faithfulness constraints. IDENT(PLACE)$_{ONSET}$ imposes a stringency relation between onsets and codas, preferring candidates that have undergone regressive assimilation (as in [kolonda] (9b)) over candidates that have undergone progressive assimilation (as in [kolomba] (9c)). Further, because there is a fixed ranking between

IDENT(PLACE)$_{\text{OBSTRUENT}}$ and IDENT(PLACE)$_{\text{NASAL}}$ such that nasals are preferred targets of assimilation over obstruents, [kolonda] (9b), which targets the root-final nasal for assimilation, is preferred over [kolomba] (9c), which targets the enclitic-initial stop for assimilation. Given that [kolomba] (9c) nevertheless wins over [kolonda] (9b), IDENT(PLACE)$_{\text{B/O}}$ must dominate both IDENT(PLACE)$_{\text{ONSET}}$ and IDENT(PLACE)$_{\text{OBSTRUENT}}$, thus ensuring that place features in the root are maintained at the cost of features in onset position and those associated with obstruents. Tableau 10 below demonstrates this ranking, expanding on Tableau 9.

Tableau 10: /kolom-da/ > [kolomba] in Musey (2)

/kolom-da/	AGREE(PL)	IDENT(PL)	IDENT(PL)$_{\text{B/O}}$	IDENT(PL)$_{\text{ONSET}}$	IDENT(PL)$_{\text{OBS}}$
a. [kolomda]	*!				
b. [kolonda]		*	*!		
☞ c. [kolomba]		*		*	*

The candidates in Tableau 10 incur the same violations for AGREE(PLACE), IDENT(PLACE), and IDENT(PLACE)$_{\text{B/O}}$ as in Tableau 9. Though the optimal candidate [kolomba] (10c) incurs violations of IDENT(PLACE)$_{\text{ONSET}}$ and IDENT(PLACE)$_{\text{OBSTRUENT}}$, these constraints are dominated by IDENT(PLACE)$_{\text{B/O}}$ and are inactive in choosing between the unfaithful candidates [kolonda] (10b) and [kolomba] (10c). There is an additional violation of IDENT(PLACE)$_{\text{NASAL}}$ by [kolonda] (10b), but this constraint, being ranked below IDENT(PLACE)$_{\text{OBSTRUENT}}$, is inactive and is omitted for space constraints.

Because the morphology of Musey only contains enclitics, it appears to violate the typological implication that languages with progressive assimilation also have regressive assimilation. This violation, however, is only superficial. The phonological system argued for above predicts regressive assimilation at a proclitic-root boundary. Because the dominant faithfulness is to consonants in root position, at a proclitic-root boundary, the proclitic-final consonant would be targeted for assimilation to preserve the root-initial consonant. Tableau 11 below demonstrates that the constraint ranking argued for above indeed predicts regressive assimilation of a hypothetical proclitic /ad-/.[14]

Tableau 11: Regressive assimilation of a hypothetical proclitic in Musey

/ad-kolom/	AGREE(PL)	IDENT(PL)	IDENT(PL)$_{B/O}$	IDENT(PL)$_{ONSET}$	IDENT(PL)$_{OBS}$
a. [adkolom]	*!				
☞ b. [agkolom]		*			*
c. [adtolom]		*	*!	*	*

The fully faithful candidate [adkolom] (11a) contains a heterorganic cluster and therefore fatally violates AGREE(PLACE). The unfaithful candidates, [agkolom] (11b) and [adtolom] (11c), each violate IDENT(PLACE) once; it is the additional violation of IDENT(PLACE)$_{B/O}$ by [adtolom] (11c) that makes [agkolom] (11b) the optimal candidate. Note that this constraint preferred the candidate having undergone regressive assimilation over the candidate having undergone progressive assimilation.

This analysis provides an account of progressive assimilation in Musey that does not exclude the possibility of regressive assimilation. Were Musey to include proclitics in its morphology, heterosyllabic clusters at proclitic-root boundary are predicted to undergo

[14] Voicing assimilation is omitted in the tableau as it is not relevant in this example.

regressive assimilation. Thus, Musey does not challenge the typological implication and the analysis presented here is likewise in line with it.

1.4 The Structure of This Thesis

This chapter introduced the framework argued for in this thesis and demonstrated its application on a system containing regressive place assimilation and a system with progressive place assimilation. Chapter 2 argues against an alternative analysis of progressive place assimilation. Chapter 3 overviews the typology of progressive place assimilation. Chapter 4 summarizes and concludes this work.

Chapter 2: An Alternative Analysis

Chapter 1 presented an analysis of place assimilation as agreement; adjacent consonants are pressured to have the same place feature, resulting in one consonant's place feature assimilating to the other. Directionality under this analysis is epiphenomenal. Regressive and progressive assimilation are possible repairs of violations of AGREE(PLACE); the choice between them emerges from the ranking of conflicting faithfulness constraints. This analysis treats regressive and progressive assimilation as equivalent, chiral processes and the motivating markedness constraint as directionally apathetic. However, this is not the only possible analysis. This chapter outlines an alternative analysis of assimilation as positional feature reduction and argues against its application in Optimality Theory.[15]

2.1 Regressive Assimilation as Positional Markedness

Approaches to regressive assimilation have largely developed in a vacuum because progressive assimilation was only weakly attested by the early 1980s (Webb, 1982 cites only Kambaata out of two hundred languages surveyed) and only unambiguously attested by the mid-1990s (Musey as described by Shryock, 1996). Thus, place assimilation had been thought to be categorically regressive. Under this approach, progressive assimilation, if acknowledged to exist, constituted a separate formal entity that obeyed its own set of constraints.

Regressive place assimilation was often analyzed as a restriction on place features appearing in coda position – the so-called Coda Condition (Steriade, 1982; Itô, 1986, 1989; Prince & Smolensky, 1993/2004; Itô & Mester, 1994; Zoll, 1998; McCarthy, 2007, 2008, inter alia). The Coda Condition can be formally defined as in (5).

[15] Specifically parallel Optimality Theory. McCarthy (2008) demonstrates this alternative approach successfully in Harmonic Serialism.

(5) CODACOND Assign one violation mark for every place feature in coda position in the output.

Informally, the Coda Condition is violated when consonants in the coda position of a syllable are specified for place.[16] It can be satisfied by debuccalizing the consonant removing its place features or by assimilating to the place feature of a following onset (as well as vacuously by deleting the consonant). Assimilation as a repair is shown in Tableau 12 below.

Tableau 12: CODACOND

/$VC_{Pl:\alpha}C_{Pl:\beta}V$/	CODACOND
a. [$VC_{Pl:\alpha}.C_{Pl:\beta}V$]	*!
b. [$VC_{Pl:\alpha}.C_{Pl:\alpha}V$]	*!
☞ c. [$VC_{Pl:\beta}.C_{Pl:\beta}V$]	

In Tableau 12, the input is syllabified into two syllables with a consonant cluster straddling the syllable boundary. The fully faithful candidate (12a) violates the Coda Condition because the consonant in coda position is specified with α place. Similarly, the unfaithful candidate in which the onset has progressively assimilated to the coda (12b) violates the Coda Condition because that place feature belongs to the coda. The optimal candidate here is (12c),[17] in which the place feature of the onset has spread onto the coda. As is clear from Tableau 12, the Coda Condition

[16] It has also been suggested that one can derive place agreement from a more general constraint that marks all consonants specified for place (Beckman, 2004). However, this approach cannot account for languages in which vowel epenthesis is the default repair for heterorganic clusters as is attested in Kiribati (Harrison, 1995) and must therefore be domain specific.
[17] This tableau excludes the candidate in which the coda consonant has debuccalized. Such a candidate would also satisfy CODACOND but violate a markedness constraint on placeless consonants, HAVEPLACE (Padgett, 1995).

can only motivate regressive place assimilation. Thus under this approach, progressive place assimilation must result from another mechanism in the phonology.

2.2 Progressive Assimilation as Domain-Specific Markedness

In the approach outlined in section 2.1, regressive place assimilation results from a restriction on place features in coda position. This can be generalized to an approach in which place assimilation results from a restriction on place features in some structural configuration. Because most known cases of progressive place assimilation target suffix-initial consonants, systems like Musey have been analyzed as satisfying a restriction on place features in an affix. This section demonstrates this approach over an affix domain, but is in principle generalizable to other domains.

The specific mechanism should not be as general as the Coda Condition because that would predict pathological languages in which the consonant inventory is restricted to phonologically placeless segments such as /h/ and /ʔ/ in affixes. Thus, instead of a general restriction on place features, this approach relies on the relative markedness of specific place features (McCarthy, 2007, 2008). This restriction is typically represented by three markedness constraints, *DORSAL, *LABIAL, and *CORONAL,[18] with *DORSAL and *LABIAL in a fixed ranking above *CORONAL (Prince & Smolensky, 1993/2004; de Lacy, 2006 and references therein). *DORSAL can be formally defined as in (6) (the others similarly so mutatis mutandis).

(6) *DORSAL Assign one violation mark for every segment specified with dorsal place.

[18] Shortened to *DOR, *LAB, and *COR respectively in tableaux

Informally, this constraint is violated by any dorsal segment and, when ranked above a relevant faithfulness constraint, compels its repair. This set of constraints is too general and needs to apply only within a morphological affix, thus a derived set, *DORSAL$_{\text{AFFIX}}$, *LABIAL$_{\text{AFFIX}}$, *CORONAL$_{\text{AFFIX}}$, which only marks segments within affixes is necessary.

This analysis is especially attractive because it explains why most progressive place assimilation systems target coronals, the intensifier enclitic /-kɪyo/ in Musey having been the only attested counterexample known in the theoretical literature. One oft cited example is the Dutch diminutive suffix /-tjə/ which surfaces homorganic to preceding nasals (van de Weijer, 2002 and references therein). Table 6 below gives representative examples.

Table 6: Dutch diminutive

	Underlying Form	Surface Form	Gloss
a.	/ze:-tjə/	[ze:tjə]	“little sea”
b.	/la:n-tjə/	[la:ntjə]	“little avenue”
c.	/ra:m-tjə/	[ra:mpjə]	“little window”
d.	/konɪɪŋ-tjə/	[konɪŋkjə]	“little king”

The data in Table 6 demonstrate this suffix undergoing progressive assimilation to preceding nasals. After vowels, the suffix surfaces with coronal place as in [ze:tjə] “little sea” (6a). This allomorph provides evidence for the underlying form. Attached to a noun with a final coronal nasal, the suffix surfaces with coronal place as in [la:ntjə] “little avenue” (6b). Attached to a noun with a final labial nasal, the suffix surfaces homorganic with labial place as in [ra:mpjə] “little window” (6c); the same is true for dorsal-final nouns (6d).

Because the coronal-initial suffix is targeted by place assimilation, in an Optimality Theoretic analysis of the allomorphy, *CORONAL$_{AFFIX}$ must dominate IDENT(PLACE) as well as IDENT(PLACE)$_{ONSET}$ to allow progressive assimilation. This is shown in Tableau 13 below with the word [ra:mpjə] "little window."

Tableau 13: /ra:m-tjə/ > [ra:mpjə] in Dutch

/ra:m-tjə/	*COR$_{AFFIX}$	IDENT(PL)	IDENT(PL)$_{ONSET}$
a. [ra:m.tjə]	*!		
☞ b. [ra:m.pjə]		*	*

In Tableau 13, the fully faithful candidate [ra:m.tjə] (13a) is ruled out by its fatal violation of the markedness constraint on coronal place within an affix. The unfaithful candidate [ra:m.pjə] (13b) satisfies this constraint while violating the lower ranked faithfulness constraints. Note that the [p] in (13b) does not violate *LABIAL$_{AFFIX}$ (which is higher ranked than *CORONAL$_{AFFIX}$) because this place feature belongs to the root /raam/. Further, the palatalization of the consonant can be interpreted as belonging to the nucleus thereby not violating markedness constraints on consonant place in the affix. While this ranking accounts for the assimilation, it wrongly predicts that the diminutive suffix surfaces without coronal place intervocalically as well. To prevent this, a constraint against placeless segments, HAVEPLACE (Padgett, 1995), must dominate *CORONAL$_{AFFIX}$. This is shown in Tableau 14 below with the word [ze:tjə] "little sea."

Tableau 14: /ze:-tjə/ > [ze:tjə] in Dutch

/ze:-tjə/	HAVEPLACE	*COR$_{AFFIX}$	IDENT(PL)	IDENT(PL)$_{ONSET}$
☞ a. [ze:.tjə]		*		
b. [ze:.ʔjə]	*!		*	*

In Tableau 14, the unfaithful candidate [ze:.ʔjə] (14b) fatally violates HAVEPLACE because it contains a placeless segment [ʔ]. This constraint is satisfied by the fully faithful [ze:.tjə] (14a) which is chosen as optimal despite its violation of *CORONAL$_{AFFIX}$. This interaction of HAVEPLACE and the affix-specific place markedness constraints predicts that the suffix will surface with a homorganic stop when attached to a nasal-final root and faithfully with a coronal stop when attached to a vowel-final root. Generally, allophony is triggered only within clusters.

This analysis is also compatible with an underlying form that is underspecified for place (van de Weijer, 2002). If the Dutch diminutive were instead /Tjə/ where /T/ stands for a voiceless stop that is not specified for place, the place markedness constraints ranked below HAVEPLACE would motivate its realization as coronal by default unless place were spread from an adjacent consonant. This is shown in Tableau 15 below.

Tableau 15: /ze:-Tjə/ > [ze:tjə] in Dutch

/ze:-Tjə/	HAVEPLACE	*DOR$_{AFFIX}$	*LAB$_{AFFIX}$	*COR$_{AFFIX}$	DEP(PL)
a. [ze:.Tjə]	*!				
b. [ze:.kjə]		*!			*
c. [ze:.pjə]			*!		*
☞ d. [ze:.tjə]				*	*

In Tableau 15 above, the fully faithful candidate [ze:.Tjə] (15a) fatally violates the highly ranked constraint against placeless segments and is ruled out. The remaining unfaithful candidates violate the low-ranked DEP(PLACE), which militates against introducing place features into the output. The fixed ranking between the affix place markedness constraints ensures that coronal place is filled in by default because it is the least marked. Thus, [ze:.tjə] (15d) is chosen as optimal as it was in Tableau 14.

This approach is in line with the hypothesis that place assimilation proper is regressive. Further, it explains why most progressive place assimilation systems target coronal consonants. However, as mentioned above, Musey has a dorsal-initial intensifier enclitic /-kɪyo/ that undergoes progressive assimilation. While this has been noted as a counter-example (e.g. McCarthy, 2007, p. 101), the empirical status of a single morpheme is difficult to weigh against a larger cross-linguistic pattern. Among the languages surveyed in this work, several exhibit dorsals being targeted by progressive place assimilation. The next section presents some of these counterexamples and argues against the alternative approach presented here.

2.3 Against a Domain-Specific Markedness Approach

The alternative analysis presented so far is well-suited for cases of progressive place assimilation targeting consonants specified with unmarked place, e.g., coronal. However, it cannot account for progressive assimilation of labial and dorsal consonants which surface faithfully outside of consonant clusters. This section examines an example from Afrikaans.

While Musey exemplifies a counterexample to the analysis so far, one need not look any further than the Germanic family for such languages. Afrikaans has a diminutive suffix cognate with the Dutch /-tjə/ that is underlyingly dorsal initial (Borowsky, 2000; Bye, 2013; A. Coetzee, personal communication, August 9, 2015). The Afrikaans suffix /-ki/ patterns similarly to the Dutch /-tjə/; it surfaces faithfully intervocalically as well as after dorsal nasals and assimilates to preceding labial nasals.[19] One key difference between the two languages is that while the Dutch suffix is consistently targeted by place assimilation, the Afrikaans suffix is not targeted after coronal nasals. Instead, when attached to a /n/-final root, the root nasal assimilates to the suffix. Representative examples are given in Table 7 below.

Table 7: Afrikaans diminutive

	Underlying Form	Surface Form	Gloss
a.	/seə-ki/	[seəki]	"little sea"
b.	/ma:n-ki/	[ma:iŋki]	"little moon"
c.	/duim-ki/	[duimpi]	"little thumb"
d.	/konɪɪŋ-ki/	[konɪŋki]	"little king"

As the data in Table 7 demonstrate, the Afrikaans diminutive surfaces with a homorganic cluster when attached to a nasal-final noun. After vowels, the suffix surfaces with dorsal place as in [seəki] "little sea" (7a), which evidences its underlying form as well as after dorsal nasals as in [konɪŋki] "little king" (7d). Place assimilation occurs when the diminutive comes in contact with coronal and labial nasals. Coronal nasals assimilate in place to the suffix surfacing as dorsal as in [maːiŋki] "little moon" (7b). Contrariwise, the suffix-initial stop assimilates to a noun-final labial nasal surfacing as labial as in [duimpi] "little thumb" (7c).

The first point to make is that the allomorphy above contradict an analysis in which the diminutive is underspecified for place. As shown previously in Tableau 15, underspecified

[19] As well as triggering allophony on preceding vowels, though this is outside the scope of the discussion here.

segments are predicted to surface with coronal place by default. Intervocalically the Afrikaans diminutive surfaces with marked dorsal place. Furthermore, the fact that coronal nasals surface as dorsal in contact with the suffix indicates that the suffix underlyingly has place features.

The second issue raised by these data is that they can be shown to yield a ranking paradox when analyzed with the same constraints used for Dutch. Under this analysis, the responsible constraint motivating assimilation of the suffix-initial consonant is *DORSAL$_{AFFIX}$ because the segment in question is the dorsal /k/. Because the /k/ assimilates to preceding labials, this markedness constraint must dominate IDENT(PLACE) as well as IDENT(PLACE)$_{ONSET}$. This ranking is demonstrated in Tableau 16 below with the word [duimpi] "little thumb."

Tableau 16: /duim-ki/ > [duimpi] in Afrikaans (1)

/duim-ki/	*DOR$_{AFFIX}$	IDENT(PL)	IDENT(PL)$_{ONSET}$
a. [duimki]	*!		
☞ b. [duimpi]		*	*

In Tableau 16 above, the fully faithful candidate [duimki] (16a) fatally violates *DORSAL$_{AFFIX}$ and is ruled out. The winning candidate [duimpi] (16b) satisfies this markedness constraint while violating lower ranked faithfulness constraints.

Recall that *DORSAL$_{AFFIX}$ is in a fixed dominance relation with *CORONAL$_{AFFIX}$ such that dorsals in an affix are universally more marked than coronals. This problematically predicts that in isolation (i.e., intervocalically) /-ki/ should surface as coronal to satisfy the highly ranked *DORSAL$_{AFFIX}$. This is demonstrated in Tableau 17 with the word [seəki] "little sea."

Tableau 17: /seə-ki/ > *[seəti] in Afrikaans

/seə-ki/	*DORAFFIX	*CORAFFIX	IDENT(PL)	IDENT(PL)ONSET
☹ a. [seəki]	*!			
☞ b. [seəti]		*	*	*

In Tableau 17, the fully faithful candidate [seəki] (17a) violates the highly ranked *DORSALAFFIX and is ruled out. The frowny face indicates that this candidate is the observed output but is predicted to lose under the given ranking. The unfaithful candidate [seəti] (17b) satisfies *DORSALAFFIX and is chosen to be optimal. To bring this tableau in line with the observed data, IDENT(PLACE) must dominate *DORSALAFFIX to prevent /-ki/ from surfacing as [ti]. However, this entails the non-assimilation of /-ki/ to preceding /m/. There is therefore a ranking paradox between *DORSALAFFIX and IDENT(PLACE) that can be taken as proof-by-contradiction against this approach.

There is still a concession to be made to the alternative analysis presented here. While the /k/ in both /seə-ki/ and /duim-ki/ violate *DORSALAFFIX, they are structurally different. In the former, /k/ is not a member of a consonant cluster. In the latter, /k/ is a member of a consonant cluster. Thus, there is still an opportunity to formally differentiate these segments in the phonology. While AGREE(PLACE) is formulated to only mark segments in clusters, affix place markedness constraints are insufficient to target these. One solution would be to include a locally conjoined constraint (Smolensky, 1995, 1997, 2006) that marks affix segments that both are specified for place and belong to clusters. Conjoined constraints are violated when both of their constituent parts are violated. In this case, the relevant constraint [*DORSALAFFIX & *CLUSTER]WD is violated when a word contains both a segment within an affix specified for dorsal place and a consonant cluster.[20] Conjoined constraints are restricted in that they must dominate their constituent constraints. Thus, the ranking [*DORSAL$_{AFFIX}$ & *CLUSTER]$_{WD}$ >> *DORSAL$_{AFFIX}$, *CLUSTER is given. Because Afrikaans admits consonant clusters, *CLUSTER on its own will rank low enough to be ignored in the following tableaux. The conjoined constraint can be ranked above IDENT(PLACE) to compel the assimilation of /k/ within a cluster while *DORSAL$_{AFFIX}$ is ranked below IDENT(PLACE) to prevent the reduction of /k/ to /t/ intervocalically. This approach therefore neatly accounts for the ranking paradox derived above. Tableau 18 and Tableau 19 below demonstrate this constraint ranking.

Tableau 18: /duim-ki/ > [duimpi] in Afrikaans (2)

/duim-ki/	[*DORSAL$_{AFFIX}$ & *CLUSTER]$_{WD}$	IDENT(PL)	IDENT(PL)$_{ONSET}$	*DORSAL$_{AFFIX}$
a. [duimki]	*!			*
☞ b. [duimpi]		*	*	

In Tableau 18, the fully faithful candidate fatally violates the high ranked conjoined constraint because the word [duimki] (18a) contains both a segment within the affix specified for dorsal place and a consonant cluster. Note that both candidates also violate *CLUSTER, which is excluded from the tableaux here. The unfaithful candidate [duimpi] (18b) satisfies this constraint and is chosen as optimal.

[20] *CLUSTER is chosen over AGREE(PLACE) because the latter constraint is difficult to justify within this analysis. Regressive place assimilation is the result of the Coda Condition and progressive place assimilation is the result of other positional markedness constraints. Thus, the presence of AGREE(PLACE) in this constraint set is odd as it would only be active when conjoined with another constraint.

Tableau 19: /seə-ki/ > [seəki] in Afrikaans

/seə-ki/	[*DORSAL$_{AFFIX}$ & *CLUSTER]$_{WD}$	IDENT(PL)	IDENT(PL)$_{ONSET}$	*DORSAL$_{AFFIX}$
☞ a. [seəki]				*
b. [seəti]		*!	*	

In Tableau 19, the unfaithful candidate [seəti] (19b) fatally violates IDENT(PLACE) and is ruled out. The faithful candidate [seəki] (19a) only violates the lower ranked *DORSAL$_{AFFIX}$ and is chosen as optimal. This approach can therefore account for the Afrikaans diminutive without deriving ranking paradoxes.

The disadvantage of this approach is that it formally separates Dutch-like languages from Afrikaans-like languages. In Dutch-like languages, the simple set of markedness constraints militating against having place features in an affix compel place assimilation. In Afrikaans-like languages, additional phonological machinery is necessary to avoid logical paradoxes. Intuitively this is the wrong approach. The unifying pattern is compelling consonant clusters to agree in place features. The theoretical apparatus should not have to distinguish between variegata; having a single solution satisfies Occam's razor and is thus more elegant. To that end, AGREE(PLACE) is a simpler, more generalized solution for the data. Furthermore, the conjoined constraint above predicts debuccalization when the diminutive suffix is attached to a noun that already contains a consonant cluster even if the suffix /k/ occurs intervocalically. This results from the domain of the constraint being the entire word.

To demonstrate the applicability of AGREE(PLACE) on these data, an Optimality Theoretic analysis of the Afrikaans allomorphy is developed below. The Dutch data can be analyzed exactly as the Musey enclitics in section 1.3.2 and are excluded from further analysis. The Afrikaans pattern can be summarized as follows: /k/ surfaces faithfully intervocalically and after /ŋ/; /n/ undergoes regressive assimilation to /k/; /k/ undergoes progressive assimilation to /m/. Because place assimilation occurs in Afrikaans, the ranking AGREE(PLACE) >> IDENT(PLACE) must hold. To derive the correct direction of assimilation, this analysis appeals to the Preservation of the Marked, the notion that marked segments are more faithful than unmarked segments (de Lacy, 2006 and references therein). Directionality is determined by the status of the root-final consonant; the marked segments /m/ and /ŋ/ resist assimilation while the relatively unmarked segment /n/ is subject to it. The relevant faithfulness constraints can be represented as paralleling the place markedness segments with the same fixed ranking: IDENT(DORSAL), IDENT(LABIAL) >> IDENT(CORONAL).[21] Because these constraints apply to consonants in the root, they can be seen as derivations of IDENT(PLACE)$_{B/O}$. Appealing to the general versions would predict the failure of the affix-initial /k/ to assimilate. Progressive assimilation is preferred to targeting root-final dorsals and labials, thus IDENT(DORSAL)$_{B/O}$ and IDENT(LABIAL)$_{B/O}$ dominate IDENT(ONSET) which in turn dominates IDENT(CORONAL)$_{B/O}$. This ranking is demonstrated in Tableau 20 and Tableau 21.

Tableau 20: /ma:n-ki/ > [ma:iŋki] in Afrikaans

/ma:n-ki/	AGREE(PL)	IDENT(DOR)$_{B/O}$	IDENT(LAB)$_{B/O}$	IDENT(PL)$_{ONSET}$	IDENT(COR)$_{B/O}$
a. [ma:inki]	*!				
☞ b. [ma:iŋki]					*
c. [ma:inti]				*!	

[21] Abbreviated in tableaux as IDENT(DOR), IDENT(LAB), and IDENT(COR) respectively

In Tableau 20, the fully faithful candidate [ma:inki] (20a) fatally violates AGREE(PLACE) and is ruled out. The unfaithful candidate [ma:inti] (20c) targets the affix onset for progressive assimilation and is ruled out by fatally violated IDENT(PLACE)$_{ONSET}$. The output [ma:iŋki] (20b) is also unfaithful but violates the lower ranked IDENT(CORONAL)$_{B/O}$ and is therefore chosen as optimal. Regressive assimilation is therefore preferred for this input.

Tableau 21: /duim-ki/ > [duimpi] in Afrikaans (3)

/duim-ki/	AGREE(PL)	IDENT(DOR)$_{B/O}$	IDENT(LAB)$_{B/O}$	IDENT(PL)$_{ONSET}$	IDENT(COR)$_{B/O}$
a. [duimki]	*!				
b. [duiŋki]			*!		
☞ c. [duimpi]				*	

In Tableau 21, the fully faithful candidate [duimki] (21a) fatally violates AGREE(PLACE) and is ruled out. The unfaithful candidate [duiŋki] (21b) is ruled out because it targets a root labial consonant for assimilation, thereby violating IDENT(LABIAL)$_{B/O}$. The output [duimpi] (21c) violates the lower ranked IDENT(PLACE)$_{ONSET}$ and is therefore chosen as optimal. Progressive assimilation is preferred for this input.

AGREE(PLACE) has thus been shown to adequately capture Dutch-type languages and Afrikaans-type languages as well as being a simpler model typologically. For the sake of strengthening the empirical value of the Afrikaans data above, two additional /k/-initial Germanic diminutives are noted below.

The Frisian diminutive suffix is /-kə/ (Tiersma, 1985); its allomorphy is more restricted than that of Afrikaans. The allomorph [-kə] surfaces faithfully after labials, [s], and [r], the allomorph [-tsjə] surfaces after coronals (including the lateral [l]), and [-jə] surfaces after velars. Representative data are given in Table 8 below.

Table 8: Frisian diminutive

	Underlying Form	Surface Form	Gloss
a.	/do-kə/	[dokə]	“little dove”
b.	/tun-kə/	[tuntsjə]	“little garden”
c.	/beam-kə/	[beamkə]	“little tree”
d.	/riŋk-kə/	[riŋkjə]	“little king”

Thus whereas in Dutch and Afrikaans, heterorganic clusters may result with the Frisian diminutive. The intervocalic [k] as in [dokə] “little dove” (8a) evidences the underlying form. There is progressive assimilation to root-final coronals as in [tuntsjə] “little garden” (8b), but not to final labials as in [beamkə] “little tree” (8c).

The Kleverlandish (Low Franconian) diminutive suffix is also /-kə/ and patterns largely as in Frisian (Stiebels, 2013). [-kə] surfaces after labials and coronal fricatives, [-tjə] surfaces after other coronals, and [-skə] surfaces after dorsals though there is additional allomorphy. Representative examples are given in Table 9.

Table 9: Kleverlandish diminutive

	Underlying Form	Surface Form	Gloss
a.	/ei-kə/	[eikə]	“little egg”
b.	/bo:n-kə/	[bœ:ntjə]	“little bean”
c.	/flam-kə/	[flæmkə]	“little flame”
d.	/ʃlaŋ-kə/	[ʃlæŋskə]	“little snake”

As in Frisian, the diminutive surfaces with dorsal place intervocalically as in [eikə] “little egg” (9a), after labials as in [flæmkə] “little flame” (9c), and after dorsals, though with an additional fricative as in [ʃlæŋskə] “little snake” (9d). It is only after coronals that place assimilation occurs as in [bœ:ntjə] “little bean” (9b).

Given the parallel patterning of its cognates in other Germanic languages, the Afrikaans diminutive is more resilient than the Musey intensifier enclitic to empirical criticism. Furthermore, as will be overviewed in Chapter 3, these patterns appear cross-linguistically in various language families and in various phonological structures. This chapter presented a plausible alternative analysis of progressive place assimilation and argued in favor of AGREE(PLACE) on formal grounds. There is additional empirical evidence for this view from progressive assimilation at prefix-root boundaries that will be presented in Chapter 3, which overviews the typology of progressive place assimilation.

Chapter 3: A Typology of Progressive Assimilation

Chapters 1 and 2 established and argued for the formal analysis of place assimilation as agreement highlighting the assimilation patterns in Diola Fogny, Musey, and the diminutive suffix of four Germanic languages. While informative, the progressive assimilation patterns presented above group together as morphologically dominant; that is direction of assimilation is controlled largely by the morphological status of the possible targets of assimilation. The attested typology of progressive place assimilation is broader than morphologically dominant languages, however. There are also languages in which direction is controlled by the manner of the possible targets of assimilation and by the place features of the possible targets of assimilation. This chapter overviews a typology of progressive place assimilation cross-linguistically providing analyses of further case studies and presents the predictions made by this analysis.

3.1 Morphologically Dominance

Morphologically dominant languages are those in which direction of assimilation is primarily controlled by the morphological status of the targeted segments. Segments in affixes are preferentially targeted by assimilation over segments in roots. In such languages, regressive assimilation is preferred at prefix-root boundaries and progressive assimilation is preferred at suffix-root boundaries. The languages with progressive assimilation thus far presented in this thesis have been morphologically dominant. This section presents the analysis of one more morphologically dominant language and provides a survey of additional languages.

3.1.1 Nankina. Nankina (Finisterre-Huon) has a morphophonological system strikingly similar to that of the Afrikaans diminutive analyzed in Chapter 2. Suffix-initial consonants progressively assimilate to preceding root-final non-coronal consonants and root-final coronals regressively assimilate to suffix onsets (Spaulding & Spaulding, 1994). The affixes surface faithfully when attached to a vowel- or glide-final root as shown in the forms in Table 10.

Table 10: Nankina suffixes attached to a vowel-final root

	root	/-na/ "my"	/-ka/ "your"	/-te/ "agent"	/-ŋan/ locative
V_	towʌ "drum"	towʌna "my drum"	towʌka "your drum"	towʌte "drum (agent)"	towʌŋan "at the drum"

These forms are used to justify the underlying representations of the affixes; the bare root form is given to justify the underlying forms of the nouns. Affixed to a root ending in a non-coronal, progressive assimilation occurs; root-final coronals undergo regressive assimilation to the dorsal-initial suffixes. Representative examples are given in Table 11.

Table 11: Nankina suffixes attached to stop- and nasal-final roots

	root	/-na/ "my"	/-ka/ "your"	/-te/ "agent"	/-ŋan/ locative
p_	tip "stone"	tipma "my stone"	tipba "your stone"	tipbʌ "stone (agent)"	tipman "at the stone"
t_	wit "house"	witna "my house"	wikga "your house"	witde "house (agent)"	wikŋan "at the house"

Table 11 Continued

	root	/-na/ "my"	/-ka/ "your"	/-te/ "agent"	/-ŋan/ locative
k_	jik "bag"	jikŋa "my bag"	jikga "your bag"	jikgʌ "bag (agent)"	jikŋan "at the bag"
m_	kwim "bow"	kwima "my bow"	kwimba "your bow"	kwimbʌ "bow (agent)"	kwiman "at the bow"
n_	nan "father"	nana "my father"	naŋga "your father"	nande "father (agent)"	naŋan "at father"
ŋ_	jʌŋ "axe"	jʌŋa "my axe"	jʌga "your axe"	jʌŋgʌ "axe agent"	jʌŋan "at the axe"

The data in Table 11 above demonstrate the bidirectional system. The dorsal-initial /-ka/ "your" suffix surfaces with labial place after a labial consonant as in [tipba] "your stone." The suffix surfaces faithfully[22] as dorsal after a vowel or a dorsal consonant as in [jikga] "your bag." Attached to a coronal-final noun, the suffix triggers regressive assimilation as in [wikga] "your house."

Recall that the Afrikaans diminutive /-ki/ behaves in much the same way as the Nankina suffixes. /-ki/ surfaces faithfully with dorsal place after vowels and dorsals, with labial place after labials, and with dorsal place after coronals, which undergo regressive place assimilation. The same constraint ranking argued for Afrikaans in Chapter 2 can therefore describe the

[22] There is a change in voicing which appears to result from an active constraint against geminates. Notice also that nasal-nasal sequences are reduced to single nasal segments as in [nana] "my father," which we would otherwise expect to surface as *[nanna].

allomorphy in Nankina. Tableau 22 and Tableau 23 below demonstrate this ranking with the suffix /-ka/ “your” attaching to the roots [kwim] “bow” and [nan] “father” respectively.

Tableau 22: /kwim-ka/ > [kwimba] in Nankina

/kwim-ka/	AGREE(PL)	IDENT(DOR)$_{B/O}$	IDENT(LAB)$_{B/O}$	IDENT(PL)$_{ONSET}$	IDENT(COR)$_{B/O}$
a. [kwimka]	*!				
b. [kwiŋka]			*!		
☞ c. [kwimba]				*	

In Tableau 22 above the fully faithful candidate [kwimka] (22a) is ruled out by its fatal violation of AGREE(PLACE). The unfaithful regressive assimilation candidate [kwiŋka] (22b) violates IDENT(LABIAL)$_{B/O}$, which is ranked as high as AGREE(PLACE), and therefore loses to the progressive assimilation candidate [kwimba] (22c). Progressive assimilation is therefore optimal for this given input. Tableau 23 demonstrates the case in which regressive assimilation is optimal.

Tableau 23: /nan-ka/ > [naŋga] in Nankina

/nan-ka/	AGREE(PL)	IDENT(DOR)$_{B/O}$	IDENT(LAB)$_{B/O}$	IDENT(PL)$_{ONSET}$	IDENT(COR)$_{B/O}$
a. [nanka]	*!				
☞ b. [naŋga]					*
c. [nanda]				*!	

In Tableau 23 above the fully faithful candidate [nanka] (23a) is ruled out by its fatal violation of AGREE(PLACE). The progressive assimilation candidate [nanda] (23c) violates IDENT(PLACE)$_{ONSET}$

and loses to the regressive assimilation candidate [naŋga] (23b) which violates the lower ranked IDENT(CORONAL)$_{B/O}$. Thus regressive assimilation is optimal for this given input and the bidirectional system of Nankina is accurately captured by the same constraint ranking derived for the Afrikaans allomorphy.

3.1.2 Bari dialects. Bari (Nilotic) has a palatal-initial qualitative suffix /-ɟa/ that undergoes progressive place assimilation to preceding nasals. This section overviews the allomorphy in the dialect Kukú (Cohen, 2000); there are similar patterns in the dialects Bari (Yokwe, 1987) and Mundari (Stirtz, 2013). Table 12 below gives representative examples.

Table 12: Kukú qualitative

	Underlying Form	Surface Form	Gloss
a.	/ŋɛr-ɟa/	[ŋɛrɟa]	"shave"
b.	/lɪn-ɟa/	[lɪnda]	"become comatose"
c.	/ʔyɛm-ɟa/	[ʔyɛmba]	"cast the evil eye"
d.	/dɛŋ-ɟa/	[dɛŋga]	"perform surgery"

As the data in Table 12 above demonstrate, this suffix surfaces homorganic to preceding root-final nasals. After /r/ and vowels, the suffix surfaces faithfully with a palatal stop as in [ŋɛrɟa] "shave" (12a), which evidences its underlying form. After nasals the suffix surfaces having undergone progressive assimilation as to the labial nasal in [ʔyɛmba] "cast the evil eye" (12c). Because the targeted consonant is an obstruent in onset position within an affix, Bari is morphologically dominant. Manner faithfulness and positional faithfulness prefer regressive assimilation for these inputs.

3.1.3 Nungon. Nungon (Finisterre-Huon) has a restrictive postposition /gon/ that undergoes progressive place assimilation (Sarvasy, 2014). The other postpositions that are targeted by this process are /h/-initial, leaving open an underspecification analysis, and are excluded here. Representative examples are given in Table 13 below.

Table 13: Nungon restrictive

	Underlying Form	Surface Form	Gloss
a.	/uwa-gon/	[uwagon]	"just the pot"
b.	/hat-gon/	[hatdon]	"just the story"
c.	/bin-gon/	[bindon]	"just the skirt"
d.	/yaarop-gon/	[yaaropbon]	"just the moon"
e.	/mum-gon/	[mumbon]	"just milk"
f.	/mak-gon/	[makgon]	"just Mother"
g.	/siŋ-gon/	[siŋgon]	"just the falcon"

Following a vowel, the postposition surfaces with an initial [g] (13a). After a coronal stop or nasal, it surfaces with an initial [d] (13b, 13c). After a labial stop or nasal, it surfaces with an initial [b] (13d, 13e). After a velar stop or nasal, it surfaces with initial [g] (13f, 13g). As Nungon only allows voiceless stops and nasals in coda position, Table 13 provides an exhaustive representation of possible inter-morphemic clusters. The post-vowel allomorph [gon] evidences the underlying form. While the allomorphy in Nungon is limited to this single postposition, the fact that it surfaces with a dorsal consonant intervocalically suggests this segment is not underspecified for place. As in the other languages surveyed in this section, the affix obstruent in onset position is targeted for assimilation because direction is controlled by the morphological shape of the input. The following two sections survey languages in which direction is controlled by other factors.

3.2 Manner Dominance

Manner dominant languages are those in which the direction of assimilation is controlled primarily by the manner features of the targeted consonants. Nasal segments are preferentially targeted for assimilation over obstruent segments. In nasal-obstruent clusters, regressive assimilation is preferred. In obstruent-nasal clusters, progressive assimilation is preferred. Because obstruent-nasal clusters are more marked than nasal-obstruent clusters across syllable-boundaries, fewer manner dominant languages are predicted to occur than morphologically dominant languages. In the latter, the domain of progressive assimilation is root-suffix boundaries which is relatively unmarked cross-linguistically. Many languages disallow rising sonority clusters. Thus, while manner dominant regressive assimilation is likely well attested, manner dominant progressive assimilation is rarer. In this section, the allomorphy of Ma Manda, a Finisterre-Huon language, provides evidence for manner dominance.[23]

3.2.1 Ma Manda. Ma Manda (Finisterre-Huon) presents bidirectional assimilation at root-suffix junctures; nasal codas assimilate to following obstruents and nasal onsets assimilate to preceding obstruents (Pennington, 2013). Nasal-final verbs undergo regressive assimilation to obstruent-initial suffixes and nasal-initial suffixes undergo progressive assimilation to obstruent-final nouns. Examples of regressive assimilation are given in Table 14 below.

[23] There are two other languages in this family that display a similar pattern, though the available data is extremely limited. Nek is reported to exhibit progressive nasal place assimilation in nominal morphology (Linnasalo, 2003, p. 41), however, the reported data is limited to two words and as such cannot form the basis of an entire subsection here. Similarly in Nabak, the possessive suffix /-ŋaŋ/ undergoes progressive assimilation but the data is limited to four clear examples (Fabian et al., 1971; McElhanon, 1979).

Table 14: Regressive assimilation in Ma Manda

root	/-be/ 2nd singular imperative	/-de/ 2nd dual imperative	/-got/ 1st singular recent past	/-qə/ same subject
lo “go up”	lowe “You go up!”	lode “You two go up!”	logot “I went up.”	loqə “go up and...”
qoŋ “throw”	qombe “You throw it!”	qonde “You two throw it!”	qoŋgot “I threw it.”	qoɴqə “throw and...”

The underlying forms of the affixes are justified by their allomorphs when attached to a verb ending in a vowel as in [lo] “go up.” The glide in [lowe] “You go up!” is unfaithful due to a general lenition process in Ma Manda. The final velar nasal of [qoŋ] “throw” surfaces homorganic to the initial obstruent of an attached suffix as to a coronal in [qonde] “You two throw it!” Examples of progressive assimilation are given in Table 15 below.

Table 15: Progressive assimilation in Ma Manda

	root	/-nə/ “my”	/-neq/ “our”	/-gə/ “your (singular)”	/-sɨ/ “their”
V_	mənde “back”	məndenə “my back”	məndenɛq “our back”	məndeɣə “your back”	məndesɨ “your back”
p_	tədep “nephew”	tədepmə “my nephew”	-	tədepgə “your nephew”	tədepsɨ “their nephew”
t_	jot “house”	jotnə “my house”	-	jotgə “your house”	jotsɨ “their house”

Table 15 Continued

	root	/-nə/ “my”	/-neq/ “our”	/-gə/ “your (singular)”	/-sɨ/ “their”
q_	tɨq “clothing”	tɨqɴə “my clothing”	tɨqɴɛq “our clothing”	tɨqgə “your clothing”	tɨqsɨ “their clothing”

While the first person possessive forms for “nephew” and “house” are missing here, the data demonstrate that the nasal-initial suffixes /-nə/ and /-neq/ undergo progressive assimilation to preceding obstruents.[24] Because Ma Manda does not permit geminates to surface, heterorganic clusters are variably tolerated, but do not surface assimilated as in [namnə] ~ [namə] *[nammə] “my brother-in-law” which is underlyingly /nam-nə/. As such, Table 15 above excludes nasal-final nouns. While nasal-nasal clusters are subject to variable deletion, obstruent-obstruent clusters surface faithfully as in [jotgə] “your house” and [jotsɨ] “their house.” The non-assimilation in these clusters can be seen both as geminate avoidance and the non-targeting of obstruents for place assimilation or deletion. In Ma Manda, only nasals are targets of place assimilation.

Because obstruents do not undergo place assimilation to satisfy Agree(Place), Ident(Place)$_{\text{Obstruent}}$ must rank as high as Agree(Place) in Ma Manda. Furthermore, because targeting an onset and targeting a segment in a morphological root is more harmonic than targeting an obstruent, Ident(Place)$_{\text{Obstruent}}$ must dominate both Ident(Place)$_{\text{Onset}}$ and Ident(Place)$_{\text{B/O}}$. Ident(Place)$_{\text{Nasal}}$ is also dominated but vacuously so due to the fixed

[24] Ma Manda only has coronal nasal-initial nominal suffixes; there is a velar nasal-initial verbal suffix, but verbs do not end in obstruents and do not therefore demonstrate clear place assimilation data (Pennington, 2013, p. 139).

ranking. Tableau 24 and Tableau 25 demonstrate this ranking for regressive and progressive assimilation respectively.

Tableau 24: /qoŋ-be/ > [qombe] in Ma Manda

/qoŋ-be/	AGREE(PL)	IDENT(PL)$_{OBS}$	IDENT(PL)$_{NASAL}$	IDENT(PL)$_{B/O}$	IDENT(PL)$_{ONSET}$
a. [qoŋbe]	*!				
b. [qoŋge]		*!			*
☞ c. [qombe]			*	*	

In Tableau 24 above, the fully faithful candidate [qoŋbe] (24a) fatally violates AGREE(PLACE) and is ruled out. The progressive assimilation candidate [qoŋge] (24b) violates the equally highly ranked IDENT(PLACE)$_{OBSTRUENT}$ and loses to the regressive candidate [qombe] (24c).

Tableau 25: /tədep-nə/ > [tədepmə] in Ma Manda

/tədep-nə/	AGREE(PL)	IDENT(PL)$_{OBS}$	IDENT(PL)$_{NASAL}$	IDENT(PL)$_{B/O}$	IDENT(PL)$_{ONSET}$
a. [tədepnə]	*!				
☞ b. [tədepmə]			*		*
c. [tədetnə]		*!		*	

Tableau 25 above is nearly identical to Tableau 24. In the latter, regressive assimilation was optimal because the input contained a nasal-obstruent cluster. In the former, the input contains an obstruent-nasal cluster /p-n/ and thus the opposite direction of assimilation is optimal. The regressive assimilation candidate [tədetnə] (25c) violates IDENT(PLACE)$_{OBSTRUENT}$ and thus loses to the progressive assimilation candidate [tədepmə] (25b). Despite being the only clear case, Ma

Manda provides an interesting example of a manner dominant language.[25] Were it the case that obstruent-nasal clusters did not surface in Ma Manda, this system would resemble that of Diola Fogny with only regressive assimilation.

3.3 Place Dominance

Place dominant languages are those in which the direction of assimilation is controlled by Preservation of the Marked (de Lacy, 2006). Coronals are preferably targeted for assimilation over labials and dorsals. In such a system, regressive assimilation would be optimal in a coronal-dorsal cluster and progressive assimilation would be optimal in a dorsal-coronal cluster.

An analysis relying on Preservation of the Marked must bear certain caveats. As Chapter 2 demonstrated, targeted coronals can alternately be analyzed as underlyingly underspecified for place features, allowing for an analysis hinging on HAVEPLACE rather than AGREE(PLACE). One clear application of such an analysis is in the apparent progressive place assimilation in Pendau (Austronesian) (Quick, 2007; Chen, 2015). Pendau has an active voice/irrealis prefix /moŋ-/ which surfaces with dorsal place before vowel-initial roots and triggers root-initial glottal stops to progressively assimilate. Table 16 below gives representative data.

Table 16: Pendau active voice/irrealis

	Underlying Form	Surface Form	Gloss
a.	/moŋ-abut/	[maŋabut]	“clear, weed”
b.	/moŋ-po-ide/	[mompedide]	“small”
c.	/moŋ-ʔomuŋ/	[moŋkomuŋ]	“carry”

[25] There is an additional bidirectional assimilation paradigm in Ma Manda related to manner. Laterals harden to voiceless stops homorganic to adjacent nasals. This allophony is largely outside the scope of this thesis as laterals present unique obstacles for place agreement. For an analysis, the reader is referred to Lamont (in press).

[maŋabut] "clear, weed" (16a) provides evidence for the underlying dorsal nasal in the prefix. While this prefix usually triggers coalescence with following voiceless stops, there are cases as in [mompedide] "small" (16b) which provide evidence for regressive place assimilation. Root-initial glottal stops surface as [k] having progressively assimilated to the prefix as in [moŋkomuŋ] "carry" (16c). Interestingly, this process (over) applies in reduplication yielding [moŋkomuŋ-komuŋ] "carry and carry." As in Dutch, this can be analyzed as the result of a constraint on placeless segments, HAVEPLACE (Chen, 2015). Tableau 26 presents such an analysis of [moŋkomuŋ] "carry" (16c).

Tableau 26: /moŋ-ʔomuŋ/ > [moŋkomuŋ] in Pendau

/moŋ-ʔomuŋ/	AGREE(PL)	HAVEPLACE	IDENT(PL)
a. [moŋʔomuŋ]	*!	*	
b. [moNʔomuŋ]		*!*	*
☞ c. [moŋkomuŋ]			*

In Tableau 26 above, the fully faithful candidate [moŋʔomuŋ] (26a) fatally violates AGREE(PLACE) and is ruled out. The regressive assimilation candidate [moNʔomuŋ] (26b) has two placeless segments, the nasal having assimilated to the placeless /ʔ/, and fatally violates HAVEPLACE. This leaves the progressive assimilation candidate [moŋkomuŋ] (26c) as the winner. It's important to note that while Tableau 26 includes AGREE(PLACE) as a dominate constraint (this accounts for the regressive assimilation in words like [mompedide] "small" (16b)), HAVEPLACE on its own predicts the same output reinforcing the alternate analysis available for segments that do not underlyingly have place features.

This alternative analysis is present for place dominance systems in which coronals are targeted over dorsals or labials, because the argument can be made for coronals to be underlyingly underspecified for place. A stronger empirical point can be made by examining a language in which labial-dorsal and dorsal-labial clusters surface either as labial-labial or dorsal-dorsal ceteris paribus. To my knowledge, such a language is unknown. However, as the following subsection details, bidirectional systems targeting coronals are attested.

3.3.1 Bavarian German dialects. Bavarian German presents bidirectional place dominant assimilation targeting coronals. This section overviews the dialect spoken in Eslarn (Bachmann, 2000). There are very similar patterns in the dialect spoken in Weingarts (Schnabel, 2000) and some restricted progressive place assimilation in Northeastern Bavarian (Rowley, 1997). Eslarn Bavarian German features intra- and inter-morphemic assimilations within the syllable onset. Initial obstruent-nasal clusters that correspond to [kn] clusters in Standard German are realized as homorganic [kŋ] clusters. /km/ clusters are realized faithfully. Table 17 below gives representative examples with Standard German cognates given orthographically.

Table 17: Intra-morphemic word-initial obstruent-nasal clusters in Eslarn Bavarian German

	Eslarn German	Standard German	Gloss
a.	[kŋəj]	Knie	“knee”
b.	[kŋex:l]	Knöchel	“ankle”
c.	[kŋak:]	Genick	“neck”
d.	[kməjs]	Gemüse	“vegetable”

As the data in Table 17 demonstrate, /kn/ clusters in Eslarn German surface with the nasal having progressively assimilated to the stop as in [kŋəj] “knee” (17a). This is also true when the cluster results from vowel deletion as in [kŋak:] “neck” (17c), the Standard German form realizing with a schwa as [gənɪk]. While /kn/ clusters surface as homorganic, underlying labial nasals do not assimilate to preceding /k/ as in [kməjs] “vegetable” (17d). The same pattern is realized across morpheme boundaries with the past tense prefix /k-/ as shown in Table 18 below. Table 18 also presents regressive assimilation targeting the coronal feminine definite article /t-/.

Table 18: Inter-morphemic word-initial obstruent-nasal clusters in Eslarn Bavarian German

	Underlying Form	Surface Form	Gloss
a.	/k-na-t/	[kŋat]	“sewn”
b.	/k-neməә/	[kŋumə]	“taken”
c.	/k-molk-n/	[kmolk:ŋ]	“melted”
d.	/k-mik-t/	[kmik:t]	“liked”
e.	/t-maws/	[pmaws]	“the mouse”
f.	/t-nosn/	[tnosen]	“the nose”

As within morphemes, /kn/ clusters are subject to progressive place assimilation as in [kŋat] “sewn” (18a) while /km/ clusters resist assimilation as in [kmolk:ŋ] “melted” (18c). The feminine definite article /t-/ undergoes regressive place assimilation to following labials as in [pmaws] “the mouse” (18e). Notice also that while the final /kn/ cluster in [kmolk:ŋ] “melted” (18c) surfaces with progressive place assimilation, the final /kt/ cluster in [kmik:t] “liked” (18d) does not. There are two likely mechanisms operating here. Nasals after final obstruents across German dialects surface as syllabic and have long been noted for their progressive assimilation

(Wiese, 1996). As such, these segments are more likely to undergo place assimilation (Cooper, 2015). The final heterorganic cluster in [kmik:t] "liked" (18d) can be analyzed as avoiding a final geminate obstruent. These two points are taken as read and excluded from the analysis below. Taking the verbal and nominal morphology together, Eslarn German thus has a bidirectional assimilation pattern targeting coronals.

Because coronals are the only targets in this system, the dominant faithfulness constraints are the Preservation of the Marked constraints IDENT(DORSAL) and IDENT(LABIAL). Ranking these constraints and AGREE(PLACE) above the remaining set of faithfulness constraints yields exactly this bidirectional system. Tableau 27, Tableau 28, and Tableau 29 below demonstrate this ranking on the Eslarn allophony. Tableau 27 presents progressive assimilation as in [kŋat] "sewn" (18a).

Tableau 27: /k-na-t/ > [kŋat] in Eslarn German

/k-na-t/	AGREE(PL)	IDENT(DOR)	IDENT(LAB)	IDENT(COR)	IDENT(PL) B/O	IDENT(PL) OBS
a. [knat]	*!					
b. [tnat]		*!				*
☞ c. [kŋat]				*	*	

In Tableau 27 above, the fully faithful candidate [knat] (27a) fatally violates AGREE(PLACE) and is ruled out. The regressive assimilation candidate [tnat] (27b) is ruled out by its violation of the high ranked faithfulness constraint IDENT(DORSAL). Thus, the progressive assimilation candidate [kŋat] is chosen as optimal. Tableau 28 presents non-assimilation as in [kmik:t] "liked" (18d).

Tableau 28: /k-mik-t/ > [kmik:t] in Eslarn German

/k-mik-t/	AGREE(PL)	IDENT(DOR)	IDENT(LAB)	IDENT(COR)	IDENT(PL) B/O	IDENT(PL) OBS
☞ a. [kmik:t]	*					
b. [pmik:t]		*				*!
c. [kŋik:t]			*		*!	

In Tableau 28 above, all three candidates violate constraints in the higher ranked stratum. The fully faithful candidate [kmik:t] (28a) violates AGREE(PLACE), and the unfaithful candidates [pmik:t] (28b) and [kŋik:t] (28c) violate IDENT(DORSAL) and IDENT(LABIAL) respectively. Because the unfaithful candidates also violate faithfulness constraints, the fully faithful output [kmik:t] (28a) incurs a subset of the violations of the unfaithful candidates thereby harmonically bounding them. Tableau 29 shows regressive assimilation as in [pmaws] "the mouse" (18e).

Tableau 29: /t-maws/ > [pmaws] in Eslarn German

/t-maws/	AGREE(PL)	IDENT(DOR)	IDENT(LAB)	IDENT(COR)	IDENT(PL) B/O	IDENT(PL) OBS
a. [tmaws]	*!					
☞ b. [pmaws]				*		*
c. [tnaws]			*!		*	

As in Tableau 27, the winning candidate satisfies AGREE(PLACE) as well as the high-ranked Preservation of the Marked constraints violated respectively by the fully faithful [tmaws] (27a) and [tnaws] (27c). The input to Tableau 27 was a dorsal-coronal cluster, resulting in progressive assimilation being optimal. In Tableau 28, the input is a coronal-labial cluster, so the preferred direction of assimilation is regressive. This constraint ranking therefore captures the bidirectional assimilation pattern of Eslarn German.

3.4 Unpredicted Assimilations

The sections above lay out assimilation patterns that accord the constraint set argued for in this thesis. While these patterns are broad and diverse, there are a small number of progressive place assimilations that are predicted to be impossible with these constraints. These assimilations are impossible because their outputs are harmonically bounded by other candidates. There are three types of impossible progressive assimilation which are given in Table 19 below.

Table 19: Impossible outputs of place assimilation

	Input (Hypothetical)	Impossible Output	Dispreferred By
a.	/an-|pa|/	*[an|ta|]	Positional Faithfulness, Manner Faithfulness, Morphological Faithfulness
b.	/an-|ma|/	*[an|na|]	Positional Faithfulness, Morphological Faithfulness
c.	/at-|pa|/	*[at|ta|]	Positional Faithfulness, Morphological Faithfulness

The hypothetical underlying forms in Table 19 are all words composed of a prefix attached to a root (roots are marked with vertical bars). As such, progressive assimilation is dispreferred in all cases by morphological faithfulness which prefers targeting the prefix consonant for assimilation. In 19a, an obstruent in onset position is target for place assimilation instead of the preceding nasal in coda position. As such, progressive assimilation is additionally dispreferred by positional faithfulness and manner faithfulness. In 19b and 19c, the consonants have equivalent manner and progressive assimilation is dispreferred by positional faithfulness and morphological faithfulness. The tableaux below provide analyses of these outputs.

Tableau 30 below demonstrates that *[an|ta|] is an impossible output of /an-|pa|/ under every constraint ranking.

Tableau 30: /an-|pa|/ > *[an|ta|]

/an-|pa|/	AGREE(PL)	IDENT(PL)	IDENT(PL) ONSET	IDENT(PL) B/O	IDENT(PL) OBS	IDENT(PL) NAS
a. [an.|pa|]	*					
b. [am.|pa|]		*				*
☜ c. [an.|ta|]		*	*	*	*	

In Tableau 30, the only ranking is the fixed dominance between IDENT(PLACE)$_{OBSTRUENT}$ and IDENT(PLACE)$_{NASAL}$. The impossible candidate (30c) is marked with a left-pointing hand, ☜, to indicate it cannot surface as optimal. The fully faithful candidate (30a) will surface as optimal if AGREE(PLACE) is dominated by IDENT(PLACE). This will ensure that marked output is more harmonic than being unfaithful to the input. When an unfaithful candidate is preferred over the fully faithful candidate, the regressive assimilation candidate (30b) will always win over the progressive assimilation candidate (30c). Note that while these candidates tie on their violations of IDENT(PLACE), the progressive assimilation candidate (30c) violates three faithfulness constraints unviolated by the regressive assimilation candidate (30b). Thus it is harmonically bounded on these constraints. The only constraint that favors (30c) over (30b) is

IDENT(PLACE)$_{NASAL}$ which cannot assert this preference because is it universally ranked below IDENT(PLACE)$_{OBSTRUENT}$ which favors (30b) over (30c). Therefore, *[anta] is an impossible output of /an-|pa|/.

Tableau 31 below demonstrates that *[atta] is an impossible output for /at-|pa|/ under every constraint ranking.

Tableau 31: /at-|pa|/ > *[at|ta|]

/at-|pa|/	AGREE(PL)	IDENT(PL)	IDENT(PL) ONSET	IDENT(PL) B/O	IDENT(PL) OBS	IDENT(PL) NAS
a. [at.|pa|]	*					
b. [ap.|pa|]		*			*	
☜ c. [at.|ta|]		*	*	*	*	

Note that Tableau 31 is largely identical to Tableau 30. The same conditions hold for the fully faithful candidate (31a) to win or for an unfaithful candidate to win. The difference in this tableau is that because the unfaithful candidates (31b) and (31c) are both obstruents, there is no asymmetry in their violations of manner faithfulness; both candidates violate IDENT(PLACE)$_{OBSTRUENT}$. Thus in this tableau, the progressive assimilation candidate (31c) is harmonically bounded by the regressive assimilation candidate (31b) for both positional faithfulness and morphological faithfulness. Therefore, *[at|ta|] cannot be chosen as the optimal output for /at-|pa|/. The same argument holds for *[an|na|] not surfacing as the output of /an-|ma|/. The only difference being that whereas the unfaithful candidates in Tableau 31 equally violate IDENT(PLACE)$_{OBSTRUENT}$, the unfaithful candidates of /an-|ma|/ equally violate IDENT(PLACE)$_{NASAL}$.

This section has outlined three input-output mappings predicted to be impossible under the analysis argued for in this thesis. The attestation of any one of these assimilations would be problematic for this analysis and force a different interpretation of the data. It is important to present these predicted gaps to demonstrate that the constraint set is not too powerful. While AGREE(PLACE) widens the predicted typology beyond that predicted by the Coda Condition as shown in Chapter 2, it does so with restraint. A poor theoretical analysis would account for the data by allowing all possible assimilation patterns, predicting the pathological assimilations given in this section. The goal of this section and the chapter broadly is demonstrate that this analysis captures the scope of the attested typology without predicting the existence of unattested languages.

Chapter 4: Conclusion

As noted in Chapter 1, progressive place assimilation is rare cross-linguistically. As attested cases slowly trickled into the theoretical phonology literature, approaches to place assimilation generally have changed to accommodate them. This thesis presented a typology of progressive place assimilation systems from several unrelated language families and demonstrated friction between these systems and current approaches to place assimilation. It argued for a simple constraint set to compel homorganicity and determine the optimal direction of assimilation from conflicting demands mapping the input onto the output. The goals of this thesis were to expand the attested typology of progressive place assimilation and establish a unified analysis of assimilation.

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