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Two lectures on prosodic morphology

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Preface

This document contains handouts and transcripts (prepared from a contemporaneous tape recording) of two lectures presented at the OTS/HIL Workshop on Prosodic Morphology, held at the University of Utrecht, June 22-24, 1994. We are grateful to the participants in the Workshop and to the organizers, René Kager, Harry van der Hulst, and Wim Zonneveld.

The article "Reduplicative Identity" is an exploration of some of the points raised in the second lecture.

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An Overview of Prosodic Morphology

Part I: Template Form in Reduplication

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1. Introduction

(1) Goal of Prosodic Morphology

Explain the character of morphology/phonology dependencies (templatic morphology, shape canons, circumscription,...) in *independent, general* terms, calling on universal and language-particular principles.

(2) Substantive Claims: First Wave

► *Prosodic Structure* is the key determinant of morphological form.

a) Prosodic Morphology Hypothesis (PMH)

Templates, circumscriptional domains, and canonical word-forms are defined in terms of the fundamental units of prosody: moras, syllables, feet, and prosodic words.

Issue addressed: What are templates?

•Characterizes shape-invariance structure of reduplicative, truncatory, and root-and-pattern morphology.

b) Template Satisfaction Condition (TSC)

Satisfaction of templates is obligatory and determined by the universal and language-particular requirements on the units they refer to.

Issue addressed: How are templates satisfied?

c) Prosodic Circumscription of Domains (PCD)

The domain to which a phonological or morphological operation applies may be delimited by prosodic criteria as well as by the more familiar morphological ones.

Issue addressed: How input form affects output.

For some recent proposals, see Prince & Smolensky (1993) and M&P (1993ab). PCD issues not to be discussed here.

(3) **Beyond Segmentalism.** PMH/TSC incorporates the templatic insight of McCarthy 1979 and advances beyond the *Segmental Theory* therein introduced and developed in Marantz 1982, Clements & Keyser 1983, Broselow & McCarthy 1983, Levin[-Blevins] 1985, Clements 1985, Ito 1986, Mester 1986, Yip 1988, inter alia.

a) Theoretical. Gains access to info encapsulated in independent defs of syll, Ft,..., eliminating need to provide apparatus to *redefine* 'heavy syllable', say, in specification of 'Plural of Declension IIIa Noun'.

b) Empirical. Superior delimitation of restrictions on T form; expression of non-segment'ly based gnrلزtns.

c) Issues raised. Non-coincidence of T and reduplicant; appearance of subprosodic restrictions on output.

(4) Second Wave of PM: Substantive Claims

► Demand for *independent, general* principles, rather than PM-specific ones, applies to PMH and TSC as well!

PMH: narrow the *specifically templatic* apparatus; increase access to general constraints on prosodic form.

TSC: construe templatic constraint satisfaction as an instance of constraint satisfaction in general; operate under same principles as parsing of elements by prosodic structure.

a) **Generalized Template: Templatic targets are determined by structural conditions**, which, interacting through constraint ranking, properly characterize the desired invariance structure.

(Steriade 1988, M&P 1990b, 1993a, 1994, Itô 1991, Itô & Mester 1992, Scullen 1993, Bat-El 1989, 1992)

b) **Generalized Template Satisfaction: 'Template satisfaction' is exactly parallel to prosodic parsing generally, through the abstract notion of correspondence.**

This will be addressed in Part II on Friday, again through the study of reduplication, including partial reduplication, default fixed segmentism in reduplicant (erstwhile prespecification), and phonologically-motivated identity or failure of identity.

(5) **Why Generalize?** Emergence of structural requirements, *not template-spellable*, from constraint interaction.

Reduplication of Long Unprefixed Roots in Axininca Campa

(M&P 1993a; cf. Spring 1989, Mutaka & Hyman 1990, Downing 1994)

a) Consonant-initial Roots

/kawosi/	kawosi– <u>kawosi</u>	`bathe'
/koma/	koma– <u>koma</u>	`paddle'
/kint ^h a/	kint ^h a– <u>kint^ha</u>	`tell'
/t ^h aaŋki/	t ^h aaŋki– <u>t^haaŋki</u>	`hurry'

b) Vowel-initial Roots

/osampi/	osampi– <u>sampi</u>	`ask'
/osaŋkina/	osaŋkina– <u>saŋkina</u>	`write'

Descriptive Generalization: The suffixed reduplicant in Axininca Campa is invariably C-initial.

This is achieved through incomplete reduplication in long V-initial roots.

Analysis: Uniform C-initiality follows from constraint interaction: ONSET > MAX

(6) MAX

Reduplicant = Base.

- ▶ One of the constraints on Base-Reduplicant *correspondence*. (To be explored Friday in Part II).
- MAX demands total identity of Reduplicant and Base. But must often settle for less, though violation is always *minimal*, and *compelled* (by a higher-ranking constraint, as usual in OT).
- Other correspondence constraints demand contiguity and edge-anchoring of the reduplicant, and they limit it to expression of material also present in the base.

(7) ONSET (Itô 1989: 223) (The well-established, widely active σ -structure constraint.)

*[_{σ} V

(8) ONSET > MAX, from /osampi+redup./ → *osampi-sampi*

Candidates	ONSET	MAX
osampi <u>osampi</u>	** !	
☞ osampi <u>sampi</u>	*	*

(9) **Second Wave II: the Templatic apparatus Narrowed toward Nothing.**

- The ineliminable. The morphological *status* of each unit of word structure must be declared.
- The shared. Morpheme classes — stem, affix— have characteristic phonological properties.
- The first. The *first* or *Occamite* theory of PM must therefore be that it is just M.

(10) **★ Claim: The phonological properties of templates are just those of the morphology generally.**

- Reduplicative template specification is primarily a matter of declaring whether the reduplicant is a *stem* or an *affix*.
- Here we will pursue this argument: first wrt *stem*, then wrt *affix*. (Using OT to develop a proposal of M&P 1991b.)

(11) **The Basic Commitments.**

- OT.** Prince & Smolensky 1993. $\Gamma_k = \rho_k(\text{CON})$. Γ_{k+} -(*in, out*) if *out* = EVAL(Γ_k , GEN(*in*)).
- Morphology.** At least a distinction between *Stem* and *Affix*. For more see, e.g., Selkirk 1982, Inkelas 1989.
- Consistency of Exponence.** (M&P 1993ab). Morphological affiliation cannot be altered by GEN.
- Reduplication.** RED_k is a morpheme lexically unspecified for segmentism, but requiring a *correspondence relation* with its *BASE*, the phonological structure to which it attaches. The *Reduplicant* is the phonological material that serves as the exponent of RED. GEN freely supplies candidate exponents for RED, which are EVALuated for goodness of correspondence. There is a (rankable) set of constraints in CON which evaluate *correspondence*. A good Reduplicant begins(ends) like its Base, has the same precedence and adjacency structure as its Base, includes nothing not in its Base, and copies everything in its Base.

2. The Reduplicant as STEM

(12) **Suppose a morpheme M has status Stem.** What follows about its phonology?

► Claim. Most harmonic state: STEM = PrWd.

• Through Alignment, the M Cat *Stem* and the PCat *PrWd* are pushed toward coincidence.

(13) **Generalized Alignment.** (Generalized from P&S 1993 EDGEMOST and ALIGN, in M&P 1993b; precursors in Selkirk 1986, P&S 1991, 1993, M&P 1993b, Itô & Mester 1993, etc. See M&P 1993b for fuller references.)

Align(Cat1, Edge1, Cat2, Edge2) =_{def}

∇ Cat1 ∃ Cat2 such that Edge1 of Cat1 and Edge2 of Cat2 coincide.

where: Cat1, Cat2 ∈ PCat ∪ GCat (prosodic and grammatical categories)

Edge1, Edge2 ∈ {Right, Left}

Also see M&P 1993b for string-theoretic definition of what it means for the edges of two constituents to *coincide*.

► "The L/R edge of every Cat1 coincides with the L/R edge of some instance of Cat2."

"Every Cat1 begins/ends with the beginning/ending of a Cat2."

(14) Typical Alignment Patterns.

a. [PrWd [Stem

b.]σ]Stem

c. [PrWd [Ft

d.]PrWd [Suffix

Ex. (a,b) shows types of alignment of M CAT Stem with PCats. Ex. (c) shows intra-phonological alignment. Ex. (d) shows affixal 'subcategorization' for a PrWd (cf. Inkelas 1989).

(15) Typical Misalignment Patterns.

a. row]Stem ed)σ = ro|d)

b. tran)(s[Root act)

c. an(dr|oid)

(16) **ALIGN-LEFT**

Align(Stem, L, PrWd, L)

"The left edge of every Stem coincides with the left edge of a PrWd."

(17) **ALIGN-RIGHT** Align(Stem, R, PrWd, R)

"The right edge of every Stem coincides with the right edge of a PrWd."

(18) **Both** are needed, due to their demonstrable independence. Both are universally present, under OT.

(19) **Axininca Campa.** Epenthesis regulated by the two Alignment constraints. (M&P 1993ab; cf. Spring 1989).

a. No epenthesis initially: here alone, onsetless syllables are tolerated.

/iŋkoma-i/ → .|iŋ.ko.ma.Ti., *.T|iŋ.ko.ma.Ti.

ALIGN-LEFT > ONSET.

b. Medial epenthesis required at V+V juncture: V^V fusion disallowed.

/iŋkoma-i/ → iŋ.ko.ma|.Ti., *.iŋ.ko.ma|i. (yet *ai* is licit diphthong!).

ALIGN-RIGHT > FILL.


c. MinWd augmentation is postpositive: although prepositive would do just as well MinWd-wise (cf. a.)

/na/ → |na|.TA., *.TA.|na|.


ALIGN-LEFT > ALIGN-RIGHT.

► Remark: by *Consistency of Exponence*, epenthesis at edge is de-aligning: epenth. element ∉ Stem.


(20) ALIGN-LEFT > ONSET. No initial epenthesis: ONSET violation forced; from /i-N-koma-i/

Candidates	ALIGN-LEFT	ONSET	FILL
a. [· iŋ.ko.ma.i.		** !	
b. [.T iŋ.ko.ma.Ti.	* !		**
c.  [. iŋ.ko.ma.Ti.		*	*

(21) ALIGN-RIGHT > FILL. FILL-violation (epenth) forced, getting Alignment, from /iN-koma-i/

Candidates	ALIGN-RIGHT	FILL
a.  .iŋ.ko.ma Ti.		*
b. .iŋ.ko.ma i.	* !	

(22) ALIGN-LEFT > ALIGN-RIGHT. Augment finally rather than initially, from /na/

Candidates	ALIGN-LEFT	ALIGN-RIGHT	FILL
a.  [na. TA.]		*	**
b. [TA .na .]	* !		**
c. [na A.]		** !	*

(23) ALIGN-RIGHT symmetrized with ALIGN-LEFT; use minimal violation to obtain asymmetry.

When $_{PrWd}$ is lacking, it is better to align with $_{\sigma}$ than with nothing.

Sometimes ALIGN-RIGHT can't be obeyed at all in Axininca Campa: under domination by ONSET and CODA-COND: /iñ^hik+i/ → iñ^hi.k|i.

(24) **Stem~PrWd homology.**(Conjecture.)

Same-edge interface alignment in the lexicon holds *only* between Stem and PrWd.

I.e. *Stem* and *PrWd* are homologous categories: they are the basic independent categories in their respective domains. This places a substantive constraint on GA, adumbrating a theory of categorial relations, perhaps based on notions of dependency. Cf. Ewen, v.d. Hulst, Harris.

(25) **Summary.** If **M** is a *Stem*, then it universally falls under both ALIGN-LEFT and ALIGN-RIGHT.

- Axininca Campa illustrates how both can be active in a grammar, though with different ranking.
- A given stem may of course yield an optimal form violating one or the other or both.
- ▶ If both are satisfied, then we have *Stem* coextensive with *PrWd*: STEM = PrWd.

(26) **Reduplication.** Suppose now that **M** is **reduplicative** and lexically declared to be a *Stem*. [RED]_{Stem}.

- This yields Stem-Stem compounding reduplication.
- This declares only the *morphological* status of the reduplicant.
- ▶ But if ALIGN-LEFT and ALIGN-RIGHT are both met, we have, further, RED = PrWd. A `Template'!

(27) **Satisfaction Guaranteed.** With RED, it is always possible to meet both interface ALIGNs.

- RED has no phonological specification lexically.
- GEN provides candidate exponents for RED
- Through inexactness of copying, the right amount of stuff can be always posited as the exponent of RED.
- ▶ The derived condition RED=PrWD, emergent from proper Alignment, thus functions as a template.

By `RED' we mean a particular reduplicative morpheme, say N-Plural₃. There is no impediment to a language having several reduplicative morphemes, each with a different lexical form and with a different correspondence function. — on the latter, cf. Part II.

(28) **From PrWd to MinWd.** PrWd qua template is always MinWd. (M&P 1991).

- We now argue that the most harmonic state of PrWd is indeed ``MinWd".
- ``MinWd" = PrWd dominating one Ft and nothing else.

(29) **Prosodic Characteristics of PrWd.**

- Foot-parsing is often maximal within PrWd, up to limits of foot binarity, FT-BIN, and it exhibits a directional asymmetry.
- ▶ This is an Alignment effect, within prosodic categories.

(30) Left-to-Right sense of Foot-Parsing in Diyari (See Poser 1989, Baković 1993, and below on polymorphemic cases.)

(káŋa)	`man'
(pína)du	`old man'
(ŋánda)(wàlka)	`to close'

(31) **Obtaining LR-sense of Foot-Parse** from Generalized Alignment

a) **ALL-FT-LEFT**

Align(Ft, L, PrWd, L)

"Every foot stands in initial position in the PrWd."

b) **PARSE-SYLL**

Every syllable belongs to a foot.

``Foot-parsing is exhaustive"

c) **Ranking of Footing Block**

PARSE-SYLL > ALL-FT-LEFT

(32) Interpretation of the Interaction.

- ▶ All feet should be *at* left edge. (ALL-FT-LEFT)
 - Fully satisfied (nonvacuously) only if there's just one foot!
 - Dominance of PARSE-SYLL forces multiple feet in longer words, in violation of ALL-FT-LEFT.
 - But feet must still be *as close as possible* to the left edge, *minimally violating* ALL-FT-LEFT.
 - This is ``directionality". (Kirchner 1993, M&P 1993b, refining EDGEMOST in P&S 1993.)
- ▶ In a form like $(\sigma\sigma)(\sigma\sigma)\sigma$, **both** PARSE-SYLL and ALL-FT-LEFT are violated.
 - *PARSE-SYLL because always an unparsed syllable in odd-parity words,
 - *ALL-FT-LEFT because the second foot is misaligned. But violation is *minimal*, unlike other conceivable parses, e.g. $[(\sigma\sigma)\sigma(\sigma\sigma)]$, where 2nd Ft is further from [.

(33) **Satisfaction Guaranteed II.** Foot-Alignment and PARSE-SYLL constraints *can be* obeyed fully. When:

- every syllable is footed and (✓PARSE-SYLL)
- every foot is initial. (✓ALL-FT-LEFT)
- ▶ Only one configuration meets both of these requirements, the *Minimal Word*, with just one foot:
[Ft]_{PrWd} *i.e.* [(σ σ)_{Ft}]_{PrWd} *or* [(μ μ)_{Ft}]_{PrWd}
- We make the standard assumption that foot size is bounded by the principle of Foot Binarity:
FT-BIN (Prince 1980, McCarthy and Prince 1986, Hayes 1991)
Feet are binary under syllabic or moraic analysis. (With no distinctions of weight, feet are syllabically binary.)
- ▶ ∴ [Ft]_{PrWd} is the most harmonic PrWd possible with respect to the constraints on PrWd form, PARSE-SYLL and ALL-FT-RIGHT/LEFT, in particular.
`Minimal Word' from M&P 1986, 1990, 1991ab; cf. Prince 1980, Broselow 1982, J. F. Cole 1990, Crowhurst 1991, Itô 1990, Itô & Mester 1992, Spring 1990, Weeda 1992, Wilkinson 1988, Yip 1991, etc.

NB. Note crucial use of alignment theory of directionality—as-*forced-violation*, limiting foot multiplicity.

(34) **Emergence of the Unmarked.** Reduplication provides a way in which the ever-present but often occluded constraints ALIGN-RIGHT, ALIGN-LEFT (Morph~Pros); and ALL-FEET-RIGHT, ALL-FEET-LEFT, PARSE-SYLL (Pros~Pros) can be fully satisfied.

- The ``unmarked" state of affairs can emerge here because there are no Faithfulness constraints forcing input segmentism to be honored despite structural imperfections resulting therefrom.
- Similarly, Itô & Mester 1992:16 on Japanese word clippings: all just PrWd, with special properties following from other requirements (Word Binarity, Edge Alignment).

(35) **Reduplication in Diyari** (Austin 1981, Poser 1982, 1989, McCarthy and Prince 1986, 1991ab)

kanku	<u>kanku</u> – kanku	`boy'
ku kuŋa	<u>ku ku</u> – ku kuŋa	`to jump'
wakari	waka– wakari	`to break'
tʰilparku	tʰilpa– tʰilparku	`bird sp.'
ŋankan̄ti	<u>ŋanka</u> – nan̄kan̄ti	`catfish'

Salient Observations (Poser 1982, 1989):

- Reduplicant = initial σCV of Base.
- Words and feet of Diyari are minimally disyllabic (except *ya* `and').
- The reduplicant has the phonology of a free-standing PrWd:
 - Both reduplicant and base bear primary stress; with vowel and cons. allophones diagnostic thereof.
 - ★Reduplicant is V-final, like all PrWd's of Diyari.

PrWd-medial syllables can be C-final or V-final. This phenomenon follows from CONTIGUITY > NO-CODA (discussed in Part II)

The Descriptive Generalization:

The reduplicant is a PrWd, the *minimal* PrWd permitted in Diyari.

(36) **Analysis:** PL_{RED} = STEM. OPT_{RED} = STEM. RECIP_{RED} = STEM.

- ▶These lexical declarations give the Plural, Reciprocal, and Optative morphemes all the rights & privileges of *Stem*.
- We now show that PL_{RED}, etc., have indeed all the properties devolving from *Stem* status, in spades.

(37) **Morphology~Prosody Alignment.**

- ▶Every reduplicant is perfectly Stem/PrWd-aligned fore & aft. `|=morph edge; `],[= PrWd edges.
e.g. [|waka|]– [|wakari|]
- ▶But this follows here from the situation in the language as a whole: *Every Stem* is properly PrWd-aligned.
 - Ergo, ALIGN-RIGHT and ALIGN-LEFT are undominated because unviolated.

(38) **A Prosodic Consequence:** the reduplicant must be *at least* bisyllabic

- Because RED = {RED}_{Stem} = [PrWD{_{Stem}RED}]
and PrWd contains Ft (≡ GEN)
and Ft is bisyllabic (≡ FTBIN)

(39) **The Stem-recursion Effect.** (On Alignment and Diyari stress, see Baković 1993, Inkelas-Orgun-Zoll 1994.)

- ▶Stress is LR-directional/iterative in sense, but monosyllabic suffixes are not integrated into feet:

ŋánda.wàlka	`to close'
púluru–ni	`mud–locative'
máda–la–ntu	`hill–characteristic–proprietary'

Note un-footparsed σ's in (pú.lu).ru.ni.

- Given Stem → Stem Af, the *monosyllable effect* follows directly from dominance of Alignment.
 - { { { mada } – la } – ntu } (morphological input)
 - ☞ [[[(máda) – la] – ntu] perfect match: { → [and] → }
 - * [[(máda)] – (là) – ntu] unmatched } : (là) – ntu
 - * [(máda) – (là) – ntu] unmatched }'s: mada } – la }
- ▶Exhaustive footing threatens Alignment.
- So: ALIGN-RIGHT > PARSE-SYLL : therefore, achieving } →] can force unfooted syllables.
- Nevertheless, with bisyllabic affixes, minimal violation of (dominated) PARSE-SYLL leads to more footing:

{ { pinadu } – wara }	
☞ [[(pína)du] – (wàra)]	*PARSE-SYLL
* [[(pína)du] – wara]	***PARSE-SYLL

(40) **The Reduplicant just follows the language here.**

- ▶Can't have a shorter or longer reduplicant just to get exhaustive parsing.
- *wa-wakari = (wá||wa)(kìri).
- *wakiri-wakiri = (wáki)(rì||wa)(kìri). } *Both horribly misaligned.*

(41) **Issue: Stability** of the Stem~PrWd correspondence cross-linguistically.

▶ Ill results (40) *can* be achieved by PARSE-SYLL > ALIGN-RIGHT, ALIGN-LEFT.

• This may need to be ruled out by some further principle(s) of ranking or evaluation.

• Cf. M&P 1993a, Ch 5.4, for domain-limited evaluation. On Faithfulness & domains, v. inf.

(42) **Prosody~Prosody Alignment.**

• We have: RED ≥ σσ

• We need: RED ≠ σσ. (so that: RED = σσ)

• And we need to get this from RED=STEM.

▶ But it is NOT the case the *Stem* is in all cases disyllabic!

(43) **Undercopying.** The Reduplicant conforms to prosodic principles by virtue of undercopying:


▶ So: Footing-Constraints > MAX

So that MAXimality of copying is violated if you get better prosody.

(44) Fuller Ranking


PARSE-SYLL > ALL-FT-LEFT > MAX

(45) ALL-FT-LEFT > MAX, from /RED+ηandawalka/ (example constructed)

Candidates		ALL-FT-LEFT	MAX
a.	 [(ηanda)]– [(ηanda) (walka)]	*	*****
b.	[(ηanda) (walka)]– [(ηanda) (walka)]	** !	

(46) Transitivity of Domination entails PARSE-SYLL > MAX, a prediction borne out:

(47) PARSE-SYLL > MAX, from /RED+wakari/

Candidates		PARSE-SYLL	MAX
a.	 [(waka)]– [(waka) ri]	*	***
b.	[(waka) ri]– [(waka) ri]	** !	

(48) **Fate of the lexical Stem.**

▶ If RED-qua-Stem conforms to strict canons, why not ordinary lexical Stems?

• Why isn't *every word of the language* bisyllabic?

▶ Ordinary Stems of Diyari, such as (waka)ri and (ηanda)(walka) violate PARSE-SYLL and/or ALL-FT-LEFT.

• Morphologically Composite Stems, too: (máda)–la–ntu, (pína)du–(wàra)

(49) **No Way Out.**


▶ Ordinary stems are *faithful* to their underlying segmentism. No losses allowed *in* → *out*.

• Judicious nonparsing could save the day: /wakari/ → (.wa.ka.)⟨ri⟩ = phonetic [.wá.ka.].

• PARSE-SEG, which requires faithful parsing of the input segments, is undominated.

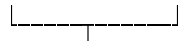
• And dominates PARSE-SYLL. Preserving segmentism at the expense of footfulness.

(50) Illustration: PARSE-SEG > PARSE-SYLL

		PARSE-SEG	PARSE-SYLL
a.	 [(waka) ri]		*
b.	[(waka)] ⟨ri⟩	*** !	

(51) By transitivity (and also direct argument from ηandawalka, PARSE-SEG > ALL-Ft-LEFT.

► **Full Hierarchy:** PARSE-SEG > PARSE-SYLL > ALL-Ft-LEFT > MAX



Footing Block

(52) **Emergence of the unmarked** is seen in the Reduplicant.

- Dominance of PARSE-SEG forces 'marked' prosodic structures in segmentally-specified morphology.
 - RED has no underlying segments that need to be parsed.
- Subordination of MAX below *Footing Block* leads to prosodic-structural unmarkedness at the expense of a perfect copying relation between Reduplicant and Base.

(MAX/PARSE-SEG differences and affinities are further explored in Part II.)

(53) **Issue:** Crosslinguistic variation under re-ranking.

- MAX could drift north, to lie *between* PARSE-SYLL and ALL-Ft-LEFT
 - Then templatic form = Ft⁺
 - Known from Japanese Hypocoristics, if not reduplication (Poser 1984)
- MAX could dominate both PARSE-SYLL and ALL-Ft-LEFT/RIGHT
 - Then reduplication is blindly *total*, regardless of considerations of metrical harmony.
 - Ex: Indonesian type *wanita-wanita* (Cohn 1989, Cohn & McCarthy in prep.).

(54) **Summary.**

- Universal structural constraints relate *Stem* and *PrWd*.
Universal structural constraints regulate the disposition of *Ft* in *PrWd*, σ/μ in *Ft*.
- Constraints of *Faithfulness* to input often force (minimal!) violation of these structural constraints.
Reduplicative *correspondence* (e.g. MAX) is an independent constraint system.
- Subordination of MAX to structural constraints yields adherence to structural norms via undercopying.
- ☞ From the morphological declaration RED=STEM, MinWd devolves, by adherence to norms.
 - There is no reduplication-specific template-forming apparatus.

(55) **Further Interactions**

- The system: C > MAX compels adherence to C in RED. (Other redup. cstrts than MAX can serve as well.)
 - This is of general applicability, effects varying with C.
- Subtler structural features can therefore be imposed on the basic MinWd frame.
 - Effects of NOCODA and FINAL-C are examined below.

(56) Makassarese (Aronoff, Arsyad, Basri and Broselow 1987, M&P 1994 — much more on Friday)

a. Roots ending in consonants other than licit codas (only geminates, η, and ʔ) are parsed epenthetically:

/rantas/	rántasaʔ	`dirty'
/teʔter/	téʔtereʔ	`quick' [téttereʔ]
/jamal/	jámalaʔ	`naughty'

The added vowel is sufficient to parse *s*, *r*, or *l* as an onset, not a coda;

Why the final epenthetic ? in addition?

b. Final-C

Align(PrWd, Right, Consonant, Right)

"Every PrWd is consonant-final."

Constraints of this type are attested fairly commonly — see M&P (1990b), Piggott (1991), McCarthy (1993a). Instead of with Align, perhaps to be connected with the even more common neutralization of final weight contrasts.

Final-C > Fill-C, from /rantas/ — The requirement that words end in a consonant is satisfied through epenthesis.

Candidates	Final-C	Fill-C
a. ☞ rantasaʔ		**
b. rantasa	*!	*

- c. Makassarese has disyllabic reduplication, like Diyari. But with polysyllabic roots, the reduplicant is **ʔ-final**:
- | | | |
|------------|------------------------|-----------------|
| /manara/ | <u>mana</u> ʔ-manára | ʔsort of tower' |
| /balao/ | <u>bala</u> ʔ-baláo | ʔtoy rat' |
| /baine/ | <u>bai</u> ʔ-baíne | ʔmany women' |
| /barambaʔ/ | <u>bara</u> ʔ-barámbaʔ | ʔsort of chest' |
- d. In Makassarese, as in Diyari, the lexical form of reduplication is [RED]_{stem}. Under Align--Left and Align-Right, RED must also be analyzed as a PrWd. Under Parse-Syll and All-Ft-Right, it is a *minimal* PrWd. And under Final-C, it is a *consonant-final* PrWd.
- e. Note that obedience to Final-C is an *emergent* property of Makassarese. Not all ordinary stems, and not all reduplicants, end in consonants. M&P 1994 and Friday's lecture provide reasons, based on alignment.

(57) Balangao (Shetler 1976, M&P 1994)

- a. Usual MinWd-sized reduplicant, analyzed as in Diyari and Makassarese:
- | | | |
|------------------------------|---|--------------------------------|
| maʔ+RED ² +tagtag | ma- <u>nagta</u> - <u>tagta</u> -tagtag | ʔrunning everywhere' |
| ma+RED+taynan | ma- <u>tayna</u> - taynan | ʔrepeatedly be left behind' |
| ka+RED+ʔabulot | ka- <u>ʔabu</u> - ʔabulot | ʔbelievers of just everything' |
- b. Reduplicant is V-final, though codas are permitted generally. This shows that No-Coda is active in determining the structure of the reduplicant:
No-Coda > Max, in Balangao, from /RED+tagtag/

Candidates	No-Coda	Max
a. <u>tagta</u> -tagtag	***	*
b. tagtag- <u>tagtag</u>	**** !	

But No-Coda is obviously not true of the language as a whole; this is a typical case of emergence of the unmarked.

- c. But why then not **tata-tagtag*, which satisfies No-Coda even better than *tagta-tagtag*? Contiguity of analysis in the middle of the reduplicant is the operative factor (M&P 1994, Friday's lecture).
- d. Precisely this interaction can be true of stems generally in a language; witness Diyari, in which all stems are V-final. That follows if Contiguity > No-Coda > Parse-Seg:

Candidates	Contiguity	No-Coda	Parse-Seg
a. <u>tʰilpa</u> (r)		*	*
b. tʰi(l) <u>pa</u> (r)	* !		**

3. The Reduplicant as *AFFIX*

(58) Reduplicants whose lexical form is [RED]_{Affix} take on the phonological properties of affixes, with emergence of the unmarked again playing a significant role. Here we review what the phonological properties of affixes are:

- Affixes are subject to size and weight requirements.
- Affixes are phonologically ``unmarked" relative to stems.
- Affixes have dependent alignment properties.

(59) Affixes are Subject to Size and Weight Requirements

- Derivational affixes in English and Classical Greek contain at least one mora (Golston 1991). (English exception: *-th*).
- Yidiny, e.g, accords special stem-like treatment to affixes > σ (cf. Hewitt 1992).
 - Some languages ban affixes > σ altogether.
- But English monosyllabic Level II prefixes must be heavy: *pre-*, *post-*, *re-*, *out-*, *de-*, etc. Light versions of many of these prefixes are found only at Level I.

(60) General Observations

- Size requirements on affixes prefer monosyllabism, and may require lightness or heaviness:

$$\text{AFFIX} \leq \sigma$$

The phonological exponent of an affix is no larger than a syllable.

- Explanations for affixal weight requirements are ultimately to be sought outside template-like constraints. (Prosodic externalization of an affix will force heaviness if PARSE-SYLL is to be obeyed, (M&P 1991b; infr.)
- Since each affix has a segmental form (which of course specifies its size and weight), size/weight requirements are observable only over classes of affixes. Not so with reduplicative affixes; they have no segmental form, so the observed shape of the affix itself reveals the size/weight requirements.

(61) Affixes are Unmarked

- Affixes are "unmarked", segmentally and prosodically, compared to stems:
 - Segmental systems of affixes are unmarked relative to stems, favoring default consonants (coronals) and vowels (Broselow 1984, Yip 198?).
 - Root-controlled vowel harmony depends crucially on unmarkedness of affixes with respect to harmonizing feature.
 - Though affixes are often syllabically incomplete by themselves, their prosodic patterns are typically simpler than those of stems (e.g., Sanskrit affixes lack onset clusters).
- To explain this, we differentiate Faithfulness constraints with respect to the root/affix divide, universally ranked as follows:

$$\text{Faith}_{\text{Root}} > \text{Faith}_{\text{Affix}}$$

Then any constraint **C** that holds of affixes, but not of roots, lies between them in the ranking:

$$\text{Faith}_{\text{Root}} > \mathbf{C} > \text{Faith}_{\text{Affix}}$$

- This is abstractly analogous to emergence of the unmarked in reduplication; the connection is made directly through the notion of correspondence, which unites faithfulness and copying, to be presented in Friday's lecture.
- The root/affix distinction is available in output forms as well as inputs, under Consistency of Exponence (M&P 1993a).
- Example: Turkish vowels
 - Parse-[back]_{Root} > *[back] > Parse-back_{Affix}
- Note that Faith_{Root} > Faith_{Affix} is no guarantee that Root will always triumph over affix in any encounter. Higher-ranking constraints can intervene, as when /CVCV+V/ → CVC(V)V (cf. Rosenthal 1994).

(62) In characterizing reduplicant structure, we will be particularly concerned with the effects of the following two constraints that stand in place of **C** in Faith_{Root} > **C** > Faith_{Affix}:

NO-CODA (P&S 1993; cf. Jakobson 1962, Clements & Keyser 1983)

$$*C]_{\sigma}$$

"Syllables may not have codas"

NO-LONG-V (P&S 1993, Rosenthal 1994)

$$*VV]_{\sigma}$$

"Long vowels (and diphthongs) are prohibited"

(63) Affixes Have Dependent Alignment Requirements

- Through recursion of Stem, the constraints ALIGN-LEFT and ALIGN-RIGHT may require that affixes be dependents, both internal and external to PrWd:

$$[[\text{Stem}]_{\text{PrWd}} \text{Affix}]_{\text{PrWd}}$$

- Affixes themselves may demand PrWd-hood of the constituent to which they are attached, in a species of prosodic subcategorization (Broselow & McCarthy 1983:53-68, Inkelas 1989, M&P 1993ab, Booij & Lieber to appear). In Axininca Campa (M&P 1993ab):
 - Augmentation (/na/ → naTA) follows from demanding PrWd-hood of a base (through FT-BIN).
 - In Axininca, C-initial suffixes do this:

(64) ALIGN-SFX


Align(Affix, L, PrWd, R) — demands $]_{PrWd} [_{Af}$
 ``The left edge of any Affix must coincide with the right edge of some PrWd."`

(65) C-initial suffixation of /na/

Candidates	FT-BIN	ALIGN-SFX	FILL
a. na piro		* !	
b. na] piro	* !		
c.  na.TA] piro			**

- ((65a) *na/piro violates ALIGN-SFX, since /piro is not immediately preceded by a PrWd.
- ((65b) *[na]/piro proffers a monomoraic PrWd, in fatal violation of the foot binarity requirement FT-BIN.

(66) V-initial Suffixation /na+aanc^{hi}/

Candidates	ONSET	FT-BIN	ALIGN-SFX	FILL
a. na]. aanc ^{hi}	* !	* !		
b. na.TA]. aanc ^{hi}	* !			**
c. na. aanc ^{hi}	* !		*	
d. na.TA].T aanc ^{hi}			*	*** !
e.  na.T aanc ^{hi}			*	*

All attempts at Alignment fail, and the decision between syllabically-successful candidates falls to FILL.

Instantiation of Affixal Properties in Reduplication

Size and Weight Requirements

Unmarked Structure (cf. Steriade 1988, and esp. Shaw 1992, who sees these matters in structural terms and is the source of many of the exx. cited here.)

(67) Sanskrit Perfect Reduplication

ta-ta:na
da-dha:ú
bu-bódha
da-dha:ra
du-dru
sa-sna:

Descriptive Generalization: Reduplicant = CV, typically an open syllable without vowel length.

(68) NO-CODA, NO-LONG-V \succ MAX, in Sanskrit, from /RED+ta:na/

Candidates	NO-CODA	NO-LONG-V	MAX
a. ta-ta:na		*	***
b. ta:-ta:na		** !	**
c. tan-ta:na	* !	*	**

In addition, *COMPLEX (P&S 1993) dominates MAX, leading to a simple onset in the reduplicant of *du-druv* etc.

(69) Nootka CV(:) Reduplication (Stonham 1990:19, 131; Shaw 1992)

a. Root [CV, Reduplicant CV-

ʔu- ʔu- 'i:h `hunting it'
 či- čims- 'i:h `hunting bear'

b. Root [CV:, Reduplicant CV:-

wa:- wa:s- čit `naming where...'
 $\text{ta:- ta:k^w a- 'i:h}$ `hunting only that'

Descriptive Generalization:

- Reduplicant is identical to initial CV, preserving length of initial vowel.
- Reduplicant is never a closed syllable CVC.

Stonham and Shaw discuss similar examples in Nitihaht and Ojibwe. In Classical Nahuatl and Tagalog CV: reduplication, the reduplicant's vowel is always long, whatever the length of the base vowel, indicating a heavy-syllable template.

(70) NO-CODA \succ MAX, in Nootka, from /RED+čims+~/

Candidates	NO-CODA	MAX
a. .čim. - čim.s~	** !	*
b. .či. - čim.s~	*	**

(71) AFFIX $\leq\sigma$ \succ MAX, in Nootka, from /RED+ta:k^wa+~/

Candidates	AFFIX $\leq\sigma$	MAX
a. ta:-ta:k^w a~		****
b. ta:k^w a-ta:k^w a	* !	

(72) MAX \succ NO-LONG-V, in Nootka, from /RED+ta:k^wa+~/

Candidates	MAX	NO-LONG-V
a. ta:-ta:k^w a~	****	**
b. ta-ta:k^w a	***** !	*

(73) Ranking Summary: Nootka

NO-CODA, AFFIX $\leq\sigma$ \succ MAX \succ NO-LONG-V

(74) Light Syllable Reduplication in Ilokano (M&P 1986, Hayes and Abad 1989)

buneg	si- <u>bu</u> -buneg	`carrying a buneng'
jyaket	si- <u>ya</u> -jyaket	`wearing a jacket'
pandiliṅ	si- <u>pa</u> -pandiliṅ	`wearing a skirt'
daʔit	ʔagin- <u>da</u> -daʔit	'(pretend) to sew'
trabaho	ʔagin- <u>tra</u> -trabaho	'(pretend) to work'
jyanitor	ʔagin- <u>ya</u> -jyanitor	'(pretend) to be a janitor'

Descriptive generalization: Reduplicant = initial C*V, but never a closed syllable.

(75) AFFIX_{≤σ}, NO-CODA > MAX, in Ilokano, from /RED+pandiliṅ/ & /RED+trabaho/

Candidates	AFFIX _{≤σ}	NO-CODA	MAX
a. <u>pa</u> -pandiliṅ <u>tra</u> -trabaho		**	***** ****
b. <u>pam</u> -pandiliṅ <u>trab</u> -trabaho		** * !	***** ***
c. <u>pandiliṅ</u> -pandiliṅ <u>trabaho</u> -trabaho	* ! * !	*** !	

(76) Hausa Noun Reduplication (Newman 1986: 116):

<u>bám</u> -bàamíí	`upper part of deleb palm'
<u>kûk</u> -kúukii	`a gum tree'

Descriptive Generalization: Reduplicant = initial CVC, with vowel length disregarded.

(77) NO-LONG-V, MAX > NO-CODA, in Hausa, from /RED+baamii/

Candidates	NO-LONG-V	MAX	NO-CODA
a. <u>bám</u> -bàamíí	**	***	*
b. <u>báa</u> -bàamíí	*** !	***	
c. <u>bá</u> -bàamíí	**	**** !	

In addition, Hausa must violate CONTIGUITY, if skipping the length of the vowel constitutes a non-contiguous analysis of the base. Of course, AFFIX_{≤σ} also dominates MAX in Hausa.

Summary

- When R=AFFIX is obeyed, the reduplicant is an affix, rather than a separate stem.
- So long as MAX is low-ranking, this entails monosyllabicity of the reduplicant, through AFFIX_{≤σ}.
- Other aspects of the canonical structure of the reduplicant are governed by syllabic markedness constraints, NO-CODA and NO-LONG-V (as well as ONSET and *COMPLEX), ranked with respect to MAX.
- The emergent unmarked shape of the affixed reduplicant parallels the structure of affixes generally, obtained from the universal hierarchy Faith_{Root} > Faith_{Affix}.

Dependent Alignment of [RED]_{Affix}

(78) Suffixing Infixing Reduplication in Chamorro (Topping 1973:183, 215-6, M&P 1986, 1990, 1993ab)

dáŋkolo	dáŋkolo- <u>lo</u>	`big/really big'
buníta	buníta- <u>ta</u>	`pretty/very pretty'
nálaŋ	nála- <u>la</u> -ŋ	`hungry/very hungry'
métgot	métgo- <u>go</u> -t	`strong/very strong'

Descriptive Generalization: Reduplicant is identical to last CV sequence in word, skipping over final coda consonant, if any. Stress placement is not affected (though Chamorro stress falls normally on penult or antepenult.)


(79) ALIGN-RED-TO-STEM

Align(RED, R, Stem, R)

``The right edge of the reduplicant coincides with the right edge of the stem."''

`RED is a suffix'. (*qua* violable constraint, after P&S 1993)

(80) Infixation — /metgot + RED/

Candidates	NOCODA	ALIGN-RED-TO-STEM
a.  .met.go-. <u>go</u> -t.	**	*
b. .met.got.-. <u>got</u> .	*** !	

Discussion:


- Simple suffixation (b) duplicates a NOCODA violation.
- This disqualifies it immediately: an ill-aligned (infixal) candidate does better on dominant NOCODA.

(81) ALIGN-RED-TO-PRWD

Align([RED]_{Affix}, L, PrWd, R) — demands]_{PrWd} [Af RED

This is a subcategorizational constraint, as in Axininca Campa.

(82) ALIGN-RED-TO-PRWD > ALIGN-RED-TO-STEM

Candidates	ALIGN-RED-TO-PRWD	ALIGN-RED-TO-STEM
a.  [.met.go]-. <u>go</u> -t.		*
b. .met.go.t- <u>ot</u> .	* !	

- In form (b), the reduplicant is an impeccable suffix, so RED/Stem alignment is perfect. But form (b) locates the reduplicant after an onset consonant, which cannot be the right edge of a PrWd. It therefore violates the dominant RED/PrWd alignment requirement. Form (a) has an infix, so RED/Stem alignment suffixes, but the reduplicant is preceded by a proper PrWd. Note that the internal PrWd bracketing is supported by the stress facts: the Chamorro infix is stress-neutral (this is otherwise inexplicable).

- A syllabic template is incapable of such subtlety; how could it explain why *metgo-go-t* > **metgot-ot*, when in neither case is the reduplicant an actual syllable?

- A parallel account can be given, *mutatis mutandis*, for Timugon Murut *u-la-lampoy* > **ul-ulampoy*.

The Heavy Syllable as Reduplicative Affix

(83) Ilokano Reduplication (McCarthy & Prince 1986, 1991b, Hayes & Abad 1989)

kaldín	`goat'	kal-kaldín	`goats'
púsa	`cat'	pus-púsa	`cats'
kláse	`class'	klas-kláse	`classes'
jyánitor	`janitor'	jyan-jyánitor	`janitors'
ró?ot	`litter'	ro:-ró?ot	`litter (pl.)'
trák	`truck'	tra:-trák	`trucks'

Descriptive Generalization: The reduplicant is a heavy syllable. Where MAX-obeying CVC heaviness is not possible for other reasons (prohibition on ? codas or special treatment of monosyllables), the vowel of the reduplicant is lengthened to ensure bimoraicity.

Proposal

•Affixes may differ, within a language and between languages, in extent of prosodic integration into the word: (Siegel, Kiparsky, Inkelas, Booij & Lieber, etc.):

Internal: [_{PrWd} Aff + Stem], [Stem + Aff]_{PrWd}

External: Aff + [_{PrWd} Stem], [Stem]_{PrWd} + Aff

The constraints responsible for distinctions like this are based on stem-alignment (Stem=PrWd) or subcategorization (Align(Suffix, E, PrWd, E') — cf. Inkelas 1989).

•Externality of an affix has significant prosodic consequences, through goodness of parsing (i.e., PARSE-SYLL, ALIGN-FT). E.g., in English

Internal (Level I) prefixes can have short/reduced vowels (*reduce, produce, decay, precede*), but external prefixes (Level II) must have long vowels (*re-target, pro-integration, de-segregation, pre-board*). Vowel length renders them footable, satisfying PARSE-SYLL, which cannot be satisfied in any other way, so long as the prefixes are external.

•So externalization of an affix, together with PARSE-SYLL, is sufficient to drive it to heaviness, even in the face of inexact copying and markedness constraints like NO-LONG-V. (Indeed, this is the **only** source of long vowels in Ilokano.) There is no heavy-syllable template.

Analysis

(84) Constraints on Reduplicant (both undominated)

$R_{\text{PLURAL}} = \text{AFFIX}$

``The reduplicant (plural in Ilokano) is affixed."''

ALIGN-AFF-WD

Align(R_{Plural} , Right, PrWd, Left)

``The reduplicant is external to PrWd. Hence, the structure is

jyan [_{PrWd} jyanitor]

ro: [_{PrWd} ro?ot]"

(85) Rankings Previously Established (on the basis of analogous examples)

a. $\text{AFFIX} \leq \sigma \geq \text{MAX}$

— The reduplicant is monosyllabic. *jyan-jyanitor* > **jyanitor-jyanitor*

b. $\text{MAX} \geq \text{NO-CODA}$

— The reduplicant may contain a coda. *jyan-jyanitor* > **jya(:)-jyanitor*

(86) ALIGN-AFF-WD, PARSE-SYLL > BASE-DEPENDENCE

BASE-DEPENDENCE (M&P 1994 and Part II) asserts that no structure is found in the reduplicant that is not also present in the base (cf. FILL in input/output relation). It is violated by *rɔ:-roʔot*, in which heaviness is forced even at the expense of inexact copying.

Candidates	ALIGN-AFF-WD	PARSE-SYLL	BASE-DEPENDENCE
a. $\left[\begin{smallmatrix} \text{ro:} \\ \text{PrWd} \end{smallmatrix} \right] (\text{ro?ot})$			*
b. $\left[\begin{smallmatrix} \text{rɔ} \\ \text{PrWd} \end{smallmatrix} \right] (\text{ro?ot})$		* !	

NB. Really need trisyllable to show *externality* from *stability* of weight, independent of stem syllabism. Note that in this case, internal [(ro:)(ro?ot)] is still better than [ro (ro?ot)].

4. Summary of the Argument

- ▶ Goal of Prosodic Morphology is discovery of *independent, general* principles that govern the properties of reduplication, root & pattern systems, circumscription, truncation, and the like.
- ▶ Templatic requirements follow from hierarchies of constraints, generalized through alignment theory.
- ▶ The properties of reduplicative templates can be reduced to asserting whether the reduplicant is a stem or an affix; the rest follows from independent principles.

References available from the authors upon request. Most relevant works can be obtained from the Rutgers Optimality Archive by anonymous FTP to [ruccs.rutgers.edu](ftp://ruccs.rutgers.edu) (see directory /pub/OT/TEXTS).

Transcript of "An Overview of Prosodic Morphology, Part I:
Template Form in Reduplication"

John McCarthy & Alan Prince

June 22, 1994

We'd like to discuss, in our talks, a couple of major issues in Prosodic Morphology: What are templates? How are templates satisfied?

What is the overall goal of Prosodic Morphology? Well, fortunately, it doesn't differ from the overall goal of any other intellectual enterprise, namely, to achieve explanation in independent general terms of a particular phenomenon that you are studying. In this particular case, there will be the kind of dependencies between phonology and morphology that you see in things like templatic morphology, the imposition of shape canons on stems and affixes, circumscriptive requirements, and so forth.

Why don't we briefly review some course of thought on this matter? If we think back to the first wave of Prosodic Morphology, following on the original work by McCarthy which was picked up by Marantz and then many others, the distinguishing claims of Prosodic Morphology are given in (2) in the handout. Perhaps the most important of these is the Prosodic Morphology Hypothesis, which holds that templates, circumscriptive domains, canonical word forms, and so on are defined in terms of the fundamental or (otherwise known as authentic) units of prosody: moras, syllables, feet, and Prosodic Words. This was accompanied by the Template Satisfaction Condition, which declared that satisfaction of templates was obligatorily determined by the universal and language-particular requirements on the constituents that they refer to. Eventually, too, a theory of prosodic circumscription was evolved, making similar use of prosodic constituents. (This raises issues which we will not be addressing in the talks given here.)

Now it is worthwhile recalling what the original Prosodic Morphology Hypothesis was in aid of. (3) in your handout briefly summarizes some of the ideas against which it was reacting. You recall the original theory of templates was that they were composed of random concatenations of C's and V's, and this involved a considerable amount of apparatus devoted to specifying and defining satisfaction of templates. This template-satisfaction apparatus existed in a world of its own, separate from other constraints on phonological and prosodic structure. So the basic kind of advance that you make by moving to a Prosodic Morphology, as you can see in (3a) on the handout, is that you gain access to information already present in grammar and in universal grammar, encapsulated in independent definitions of constituents like syllable, Prosodic Word and so forth. You therefore eliminate the need to provide a parochial apparatus to redefine, as it were, these notions every time you want to say what, for example, the plural of the fifteenth declension of a feminine noun is. So this obviously is an important step forward.

We also claimed important empirical virtues to Prosodic

Morphology, such as superior limitations and restrictions on templatic form, and expression of generalizations which really could not be expressed in purely segmental terms. Perhaps the most important motive, one which we will try to amplify in our talks, is the idea of gaining access to and making use of information and principles which are independently in the grammar, to avoid a proliferation of arbitrary formal apparatus for the simple purpose of describing what we feel you must describe.

OK, once we have this goal of explanation fixed in mind, it occurs to us to scrutinize the very proposals that we have just made. So in (4) on the handout, we summarize some recent scrutiny of the original Prosodic Morphology system, and we observe that both the Prosodic Morphology Hypothesis and the Template Satisfaction Condition can be asked to be more independent than they currently are, independent parochial components of a Prosodic Morphology system.

So, how would one go about trying to gain further explanatory depth and understanding? Well, in terms of the Prosodic Morphology Hypothesis, obviously we want to narrow the specifically templatic apparatus, the machinery that allows us to articulate what can be a template. And we want to increase the access to general constraints on prosodic form, which we hope would do that work for us, so that we would see in template forms an echo of principles that define the form of other things besides just templates. Similarly with the Template Satisfaction Condition, one would like to construe template satisfaction as an instance of constraint satisfaction in general.

And now we have perhaps a much better understanding or at least a clearer view of what something like constraint satisfaction in general might be. With this in mind you can try to operate under the very same principles for satisfying templates that apply to satisfy other prosodic and phonological requirements. So this leads to a couple of generalized versions of the original ideas, which you see in (4a) and (4b) on the handout. One of these is the generalized template, as René articulated this idea in his introduction. We assert that templatic targets are to be determined by structural conditions which interact with one another (via constraint ranking under Optimality Theory) to properly characterize the desired invariance structure.

What do we have in mind here? Well, the original conception with C's and V's was kind of what you might think of as a Tinker-Toy model. (A Tinker-Toy is a kind of construction set which American children used to play with.) You can imagine building a skeletal structure, which is a *literal structure*, and you can stick more things on it as phonology proceeds. That conception sees the template as a real object to which other objects are attached, whereas in (4a) we propose to argue that the template emerges from the force of sets of conditions, and it itself is not an object in any sense. Then this goes with (4b) which is the idea that template satisfaction (so-called) is just prosodic parsing. (As we'll show in the second lecture, the abstract

notion of correspondence explains how this takes place in reduplication.)

Aside from this glorious grand view of things, which tells us to go ever higher into more rarified spheres of explanatory ambition, you might ask yourself why do we generalize, what direct motive is there for this? And, in (5) on the handout, page 2, we've presented a very direct argument. If you examine the templates of the world, you will quickly see that many of them show structural requirements which are not actually spell-able-out in terms of any conception of templates that is around, in terms of the Tinker-Toy or structural module idea.

Let's consider briefly the reduplication of long unprefix roots in Axininca Campa. In (5a) we see the consonant-initial roots reduplicating completely. In the case of vowel-initial roots we see a divergence from this pattern. The descriptive generalization is given at the bottom of (5): the suffixed reduplicant in Axininca Campa is invariably consonant-initial, and this is achieved by incomplete reduplication of long, vowel-initial roots. What is interesting about this is that it is a silly prospect to try to characterize a reduplicant of Axininca Campa in C/V terms, even though I have just referred to a C as a key hallmark of the reduplicant. If you want to characterize it in C/V terms, you must say it is something like CVVCCVVCCV, which simply spells out in a dogged fashion the longest expansion you can get of words in the language that begin with consonants. So this is an exact example of what I said when we were discussing is (3) on the handout – about developing a formal apparatus which would allow you to spell out, amidst the random things you could say, exactly the Prosodic Word of the language.

Now, then, let's imagine that we want to characterize the template as a sequence of syllables or as some constraint on the number of syllables or even by allusion to a higher-order category such as foot or Prosodic Word. Well, once you start climbing the tree, you lose all ability to say what the little C's and V's are doing down below. That is a very desirable characteristic, as we've argued: to go to the highest level you can possibly go to and inherit from that all the information about its form. Here's a case where a certain amount of information is not inheritable. So we conclude that this kind of requirement or observation – that the template always begins with a consonant – is not encodable in any known theory of templates that makes any sense.

So what could this be? We will argue, and this will provide an argument in small of everything we will say subsequently, that the uniform consonant-initiality follows from a constraint interaction; namely, the constraint ONSET, which demands that syllables have onsets, dominates the constraint MAX, which, as you see in (6) on the handout, demands that reduplicative copying be complete – that the base be completely copied. (In (6) on the handout we have a crude formulation of MAX which will suffice for the present discussion.) In (7) we see a statement of the ONSET constraint, following the proposal of Itô, though any conception of syllable structure will have to say something equivalent.

What's more important is not the formal presupposition but the requirement that ONSET dominate MAX in the sense of Optimality Theory, and that in reduplication you have a very wide choice of possible reduplicants. Here we have two choices from among the possible reduplicants. Since under Optimality Theory it is not necessary that a constraint be absolutely adhered to, so although we have the constraints in (6), we will contemplate every possible arrangement of sounds in relation to the base and determine which one copies it to the best degree. We see here in (8) that the one which provides us with the closest copy of the base, yet still meets the ONSET constraint, is exactly the one which omits the vowel.

So this argument establishes the need for a new conception. Suppose therefore we want to pursue the explanatory imperative, where should we start? Let's contemplate a few given priors as in (9) in the handout. What is ineliminable? What must we say? We must say what the morphological status of each unit of word structure is. We must say whether a given morpheme is a Stem or whether it is an Affix. This is not something which follows from anything else.

What can possibly be shared then between templatic morphology and regular morphology? Well, we notice that morpheme classes such as Stem and Affix have characteristic phonological properties and we will expand upon these. Therefore, the following possibility arises, which is the one we will pursue today, that morpheme classes have characteristic phonological properties, and in reduplicative morphology what we are seeing is simply these utterly characteristic phonological properties, associated with categories like Stem and Affix, reproduced with excellent exactitude. We can assert the claim in (10), that phonological properties of templates are just those of morphology generally: reduplicative template satisfaction is primarily a matter of declaring the morphological status of the reduplicant — something we cannot get away from. That is, once we say whether the reduplicant is a Stem or an Affix, we have committed ourselves to a cascade of phonological consequences. Here we will pursue this argument -- first with respect to Stem and subsequently with respect to the notion Affix.

What are our basic commitments before we plunge into this analysis? Well, first we assume Optimality Theory as summarized on (11a) in your handout. Namely, the k th grammar is the k th ranking of the universal set of constraints which are present in every grammar, and a grammar accepts an input/output pair if the output pair is the optimal member of the candidate set produced from the input, when measured against the ranked constraints of that grammar.

Morphology — what do we assume in morphology? Well, we are going to make the rather crude assumption that there is simply a distinction between Stem and Affix, though, of course, there are many theories of morphology — you might examine work by Selkirk, Inkelas, and many others, who pursue the fine grain of this.

We will also make a crucial assumption which we can call

Consistency of Exponence: morphological affiliation is something that is established in the lexicon and is constant over the entire candidate set. It is not changed by the generation of the profusion of phonological candidates – it does not change what segments belong to what morpheme, either by taking them away or putting extra ones in.

Finally, how does reduplication work? Well, reduplication works this way. A reduplicative morpheme, which we will often abbreviate as RED, is a morpheme which is lexically unspecified for its segmental content. In other words, lexically it has no segments, it is unspecified for that. What it does come with is a correspondence relation with the base, which is the phonological structure to which the morpheme attaches. We will use the term *reduplicant* to refer to the phonological material that serves as the exponent of this reduplicative morpheme.

How does this unspecified morpheme get its segmental exponents? The answer is: they are freely supplied by Gen – anything will do as a possible reduplicant, any string of segments organized in any way. This candidate set will be evaluated for goodness of correspondence with the base and this goodness will be determined by a rankable set of constraints in Con, the set of universal constraints present in every grammar, which evaluate correspondence. Roughly speaking, a good reduplicant will begin or end like its base; it will have the same precedence and adjacency structure among its segments as the base; it will include nothing that is not in the base; and it will copy everything that is in the base. So it has this variety of lovely and desirable characteristics.

Let's now pursue the imperative here. Suppose we declare (as on page 3) that some particular morpheme has the status Stem – what follows about its phonology from this declaration? What we will claim is that phonological consequences from universal constraints on the morphology/phonology interface. In particular, the equation $\text{Stem}=\text{PrWd}$ will come out as the most harmonic or desirable state of relationship between this particular morphological and that particular phonological category. We will argue that this is accomplished through the theory of Alignment, so that the morphological category Stem and the prosodic category PrWd, by the alignment of their edges, will be pushed toward coincidence.

In (13) on the handout, there is given a statement of the theory of Generalized Alignment which provides a general schema for the coining of constraints. It is summarized under the last line of (13): the left/right edge of every category #1 coincides with the left/right edge of some instance of category #2. So it marks how categories begin and end simultaneously, where the end of one category must be adjacent to the beginning of another, and so forth. In (14) a couple of typical alignment patterns are demonstrated in abstract. The first one demands alignment between morphology and phonology, the third one (14c) between two phonological categories, and the last one between morphological and phonological categories.

In (15) you see some ways that you can achieve *misalignment*. So take a word like *transact* from English. Clearly the root is *act*, but the root boundary falls right amid the syllable *sact*, so this is a classic example of misalignment, where the boundary of the morphological entity and the boundary of the phonological entity do not coincide.

We will be dealing here with two kinds of constraints – ALIGN-LEFT and ALIGN-RIGHT. One demands that the beginning of the Stem be the beginning of the Prosodic Word – that's (16). And (17) demands that the end be the end. We now note that both can be independently justified. So you might be asking yourself, you wrote out this equation up there Stem=PrWd, why don't you stick with that? Well, the reason is that we can gain the result through the general theory of alignment and because we can show the need to distinguish between left and right alignment, as in (19), because they are different in their rankings in the grammar. These arguments are summarized in (19) through (22).

To summarize then, if some morpheme is a Stem, then it universally falls under ALIGN-LEFT and ALIGN-RIGHT, as mentioned in (25) in your handout on page 4. The Axininca Campa example shows how both can be active in a grammar. The interesting point that emerges from this example is that a given Stem may, of course, yield an optimal form that violates one or the other, or indeed both, of these constraints. So a given lexical Stem with lexical segmentism can have its own reasons not to meet the constraint. However, if it should happen, through good fortune, that both are satisfied, because the particular lexical Stem is equipped with the right segmental material to both begin and end with the Prosodic Word, then you have a lovely situation whereby, by meeting both constraints, you have equated the morphological category Stem with the phonological category Prosodic Word.

But this equation is exactly what a template accomplishes. We see now, dimly in the distance, how by imposing general constraints on morphology we can achieve a result which is exactly like a template. Why does this have any particular effect on reduplication? We know that phonological constraints are violated all the time in phonological material. What sense does it make to argue that we have a template if this is met, when just before we've been talking about violation? The answer is given outline form in (27) in the handout. It has to do with the peculiar characteristics of reduplication. The fact that the reduplicant has no segments means that it does not fall under the constraints of the language which bear on the realization of underlying segments in the language. So reduplication has its own little special quirk and the advantage of the special quirk is that it allows it to satisfy constraints which fixed segmentalism morphemes cannot satisfy.

How can this happen? In (27) you see that GEN provides a vast sea of candidates. We noted that the copying relationship is one that is covered by violable constraints, so it need not always be exact – in fact, it is characteristically inexact. Therefore, though, carefully judicious inexactness – failure of exactness of copying – the right amount of phonological material

can be posited as the exponent of the reduplicant, and thus the reduplicant is in a peculiarly good position to satisfy these constraints. We call this particular effect the Emergence of the Unmarked, where constraints which are violated in the grammar as a whole have their purity seen in their dominion over some small area of grammar where, for whatever reasons, it is possible to meet them.

Let's now move on to page 5 of the handout. What do we establish by the argument so far? We have seen how, by imposing well-motivated and universal conditions on the morphological category Stem, we get a certain restriction of the Stem to the Prosodic Word, when these conditions can be met. What does that tell us? A Prosodic Word is something which contains at least a foot, so this sets a size limitation right here on what can be reduplicant: a reduplicant must be a foot, so it must be at least two moras (or two syllables in a quantity-insensitive system). What do we need to get the kind of templates which we frequently encounter? We need to take one step further. We've taken a step from the morphological domain to the phonological domain. We've advanced from Stems to Prosodic Words. Now we need to make one further advance, from the Prosodic Word as a whole, encompassing one foot, two feet, three feet and a few loose syllables lying around, to the notion "minimal word" which, as I'm sure you know, is a templatic idea that occurs with astonishing frequency in the languages of the world.

How will this argument proceed? Well, I imagine that you can guess right now. We argue that the most harmonic or ideal Stem is one which coincides with the Prosodic Word at its edges. We now will argue that the most harmonic state of the phonological category Prosodic Word is indeed its minimal realization. We will argue this not by fiat, but in exactly the same way as before, by pointing to independently needed constraints which exist in the grammars of the world and do tremendous work for us. If we look at them carefully we'll see that they will yield the desired prediction.

Let's briefly review the prosodic characteristics of the Prosodic Word, as in (29). What we recall is that foot-parsing is often maximal within the Prosodic Word, up to the limits of foot binarity. That means that the general story about footing is to absorb all the syllables into feet as much as you can – occasionally you'll have a stray syllable that you cannot absorb because of Foot-Binarity – because feet consist of a single mora. We claim that this is also an alignment effect, happening this time within prosodic categories, not at the interfaces.

In (30) some data is given to fuel the imagination. The left-to-right sense of foot-parsing in Diyari is shown here. (This language will be much discussed in the second half of the talk.) Here we see the typical thing – a trochaic disyllabic foot proceeding in a left-to-right sense. How is this obtained under Generalized Alignment? This is the result of the interaction of two constraints, one forcibly dominating the other. The first constraint is a simple alignment constraint which we can call ALL-FT-LEFT, which says that every foot should stand in initial

position in the Prosodic Word. That's (31a) in the handout. And the second interacting constraint is one which you can call PARSE-SYLL, which declares that every syllable belongs to a foot – that is to say, foot-parsing is exhaustive in a way that I just mentioned. These will stand in a relationship of domination, as in (31c).

What's the interpretation of this? Well, first of all, what does ALL-Ft-LEFT say? It says that every single foot in the word stands right at the beginning of the word. This seems like a very curious thing to say because we have words like *nāndawālka* and many long words in English, Dutch and other languages which show many feet trooping one after the other. So, this constraint will be fully satisfied, in fact, only if there is just one foot in the word. What can force it to be violated? PARSE-SYLL can. You can demand that syllables should belong to feet, and this can force you to violate the constraint that every single foot should be at the beginning. However, as in other cases in Optimality Theory, violation must be minimal. Just because a constraint is violated, it does not give you free hand to do what you want. Rather you must adhere as closely as possible to the harmonic ideal of non-violation. In this particular case, what that will mean is that feet must be as close as possible to the beginning. So, if every foot can't be at the beginning, at least every foot wants to be as close as possible to the beginning. You can see that this will generate the sense here of left-to-right parsing. By a mirror-image argument, you can show that you can generate a sense of right-to-left parsing as well.

We have a typical domination relationship here. PARSE-SYLL is the dominant concern. As many syllables as possible must be forced into feet, and this compels you to violate the desire to have every foot at the beginning. You violate it minimally by hooking them up as close as you possibly can get to the beginning. Now, in ordinary words of the language, this is going to be typically violated, and violated repeatedly, because you can have a word with three or five syllables in it, forcing you to have a free syllable. You can have a word with four syllables in it – this will force you to have two feet, the second of which will not be at the beginning. If you want to keep all of the segments in the word and not just throw away things, which is something languages seem to tend to do, probably for reasons outside of linguistic interest, then you are going to be forced in the language as a whole to rampant violation of both of these constraints. But when the violation is minimal you simply have directional foot parsing.

Let's again turn to the question of how these constraints can be exactly satisfied – that's seen in (33). We have a second instance here of a case where constraints that are roundly violated nevertheless admit perfect satisfaction in certain structural arrangements. Under (33) this structure is noted: if you want every syllable to be footed and every foot to be initial, you can satisfy both of these constraints by having a Prosodic Word which contains exactly a single foot, as seen in (33). If you have a Prosodic Word with just one foot, then certainly that foot is initial, and certainly every syllable in

the word is properly footed. Therefore, we have deduced as desired that the model Prosodic Word is the most harmonic Prosodic Word possible with respect to the constraints on Prosodic Word form, PARSE-SYLL and ALL-FT-LEFT. The crucial part of the argument is that it costs to have feet outside of peripheral position. So to get rid of all costs you simply have one foot. This is a situation of emergence of the unmarked, because reduplication, with its freedom of choice of what can be the reduplicant, provides you with a way in which these ever present constraints (by hypothesis, present in every grammar) can be perfectly satisfied. (We note that similar arguments have been made by Itô and Mester in their work on Japanese word clippings, in which they assert that all clippings are just instances of Prosodic Word, with special properties obtained from other constraints.)

So then to summarize –the course of the argument goes like this. We must say what the morphological category of a morpheme is, Stem or Affix. What is that special property of the reduplicant which guarantees that it can just be anything you want? The answer we propose is that the special property of the reduplicant is chosen in a way that allows it to meet constraints which other morphemes are often forced not to.

The example of Diyari in (35) is a case of exactly this type, in which the size of the reduplicant is the same as the size of the end shape of the minimal word of the language. Diyari is one example we cite here, but there are actually quite a few others, as I'm sure you know, in which a minimal-word-sized reduplicant is attached to the base. The salient observations about Diyari are listed below the examples in (35). First, the reduplicant consists of two syllables: the first is an exact copy of the first syllable of the base and the second is the initial CV sequence of the second syllable. In general, feet of Diyari are disyllabic and words are minimally disyllabic with a single exception, so the disyllabicity of the reduplicant does accord with the size of the foot and the minimal word.

Furthermore, the Diyari reduplicant has the phonology of a free standing Prosodic Word, so the reduplicant and the base stand to each other in a relationship of phonological compounding of some sort. Both the reduplicant and the base bear primary stress, according to Austin, and they show vowel consonant allophones that are diagnostic with primary stress. In addition, the reduplicant must be vowel final, and this too is a general property of Prosodic Words in Diyari. So the descriptive generalization is what you see just in (35) – that the reduplicant is a Prosodic Word, but the minimal Prosodic Word permitted in Diyari.

The analysis accords with the overall summary that we just gave – that in Diyari the lexical form of the reduplicant is a Stem, for all the various forms of the reduplicant and all the various morphological functions of the reduplicant in this language. These lexical declarations give the reduplicant all the rights and privileges of a Stem, and now we'll see that these rights and privileges include exactly the phonological properties

observed of the Diyari reduplicant.

First of all there is the fact that the Diyari reduplicant is a free-standing Prosodic Word, as we just noted. That's actually a general fact about Stems in Diyari (though it needn't be true in all languages, or languages showing this property, for reasons of constraint ranking). For example, *waka-wakari* is perfectly Stem and Prosodic Word aligned, both at the beginning and at the end. The reduplicant *waka* is a Stem and a Prosodic Word, and the base *wakari* is also both a Stem and a Prosodic Word.

If you look at examples like (40) you see the potential effects of bad alignment on the form of the reduplicant. For example, you could achieve somewhat better foot parsing than in the actual case by copying less or copying more, and unaligning. But in either of those conditions you get a violation of the requirement that the Stem and the Prosodic Word coincide with one another.

The result that's established so far is summarized in (42) on page 7 of your handout. What we have is the fact that the reduplicant is a Stem – that's the lexical stipulation about the reduplicant in Diyari. From that we've obtained the result that it must consist of at least two syllables. We've obtained that from the fact that, because it is a Stem, it is also a Prosodic Word and a Prosodic Word must contain a foot and a foot must contain at least two syllables.

Now what we want to do is one more thing – we want to obtain the further result that the Diyari reduplicant is **not greater than two syllables**. We have the result that it has at least two syllables, like all Prosodic Words in a language, for reasons having to do with Alignment and the Prosodic Hierarchy. Now we want to say that, unlike all other Stems of the language, the reduplicant cannot be greater than two syllables. How do we obtain that? By undercopying, as described in (43). The reduplicant conforms to the prosodic principles (the "footing block" of constraints) through undercopying, if the footing constraints crucially dominate MAX. That is exactness of copying, Maximality of copying, is sacrificed to achieve better prosody.

The full ranking, then, is what you see in (44). As we have already established, PARSE-SYLL dominates ALL-FT-LEFT – that's what's responsible for the pattern of left-to-right footing in Diyari – and this footing block of constraints must dominate MAX if it is to control the extent of reduplication. The tableaux (45) and (47) show how the constraints of the footing block, ALL-FT-LEFT and PARSE-SYLL, through domination of MAX, lead to maximal disyllabicity of the Diyari reduplicant. In the first tableau, (45), with a quadrisyllabic base, the comparison is between the exact copy (45b) and the less than full copy (45a). The exact copy cannot be optimal, because it posits one more unaligned foot than the inexact copy in (45a). Lesser violation of ALL-FT-LEFT, as in (45a), is preferred, as long as ALL-FT-LEFT dominates MAX, as we assert here. By transitivity of domination, PARSE-SYLL, which dominates ALL-FT-LEFT, must also dominate MAX, and that's

confirmed by the tableau in (47), which examines an odd parity base (a trisyllable). The comparison again is between a disyllabic reduplicant in (47a) and an exact reduplicant in (47b). The exact reduplicant must posit one more unparsed syllable than the inexact reduplicant, and therefore it cannot be optimal as long as PARSE-SYLL dominates MAX. These two tableaux show that the Diyari reduplicant is maximally disyllabic, regardless of the length of the base.

One question that naturally arises in this context is raised in (48): the reduplicant must conform to strict canons of footing – that is all of its syllables must be footed and all of its feet must be aligned. So why don't ordinary lexical Stems of the language show the same property or, to put it differently, why isn't every Stem and every word disyllabic? The answer is that ordinary Stems of the language – nonreduplicated ones – have no way out, as you can see in (49). They are faithful to their underlying segmentism – no losses (that is deletions or failures to parse) are allowed in the mapping between input and output. Though by simply leaving segments out of the parse it would be possible to achieve perfect foot parsing and perfect foot alignment, the failure to parse those segments would be fatal as, indeed, tableau (50) shows, since PARSE-SEG crucially dominates PARSE-SYLL.

The full hierarchy of constraints is summarized in (51) and the interpretation of this is seen in (52), where we show that this is yet another example of emergence of the unmarked. The dominance of PARSE-SEG forces marked prosodic structures, that is, unfooted syllables and unaligned feet, in the segmentally-specified morphology. But the reduplicant has no underlying segments that need to be parsed. Its segments are all provided by Gen. So ranking the constraint MAX, which regulates the exactness of copying the reduplicant, below the footing block leads to unmarkedness with respect to the footing constraints at the expense of perfection of copying.

Of course, this proposal, in which these particular constraints are adduced here and ranked, entails that there ought to be cross-linguistic variation in the ranking. A fundamental principle of Optimality Theory is that ranking of constraints differs from language to language, and the various permutations of this ranking ought to correspond to real grammars, if the constraints are correct. Cases of that sort are discussed in (53). So for example, the clearest of these is where MAX itself also stands undominated with PARSE-SEG, crucially dominating PARSE-SYLL and ALL-FT-LEFT. In that case, reduplication is always total, regardless of the consequences for foot parsing or for foot alignment.

To sum up then, what we have are universal structural constraints that relate Stem and Prosodic Word. These structural constraints are ALIGN-LEFT and ALIGN-RIGHT. There are other universal structural constraints that regulate the disposition of unfooted syllables and of feet themselves within the Prosodic Word: PARSE-SYLL and ALL-FT-LEFT or ALL-FT-RIGHT. There are also constraints of faithfulness to the input, such as PARSE-SEG, which

may force violation of these structural constraints. But reduplicative correspondence or exactness of copying is an independent constraint system from faithfulness – though a related one, as we'll argue on Friday. The subordination of MAX to these structural constraints will mean that the structural constraints are obeyed in the reduplicant via undercopying, even though they are violated in the language as a whole. So from the declaration in the morphology that the reduplicant is a Stem and from the ranking of MAX with respect to these structural constraints, the minimal word reduplicant devolves. There is then no reduplication-specific template responsible for the minimal word reduplicant.

If you'll turn now to page 9, section 3, what we propose to do here is to extend this result from Stem to Affix. We've established that reduplicants whose lexical form is Stem take on the phonological properties of Stems. And we want to extend this result to the affixed reduplicant, keeping an eye on the goal of reducing the templatic apparatus of reduplicative theory toward nothing. To understand the affixed reduplicant, we need to know what are the phonological properties of Affixes generally, just as we have established the phonological properties of Stems generally (with ALIGN-LEFT and ALIGN-RIGHT).

Pages 9 and 10 cite several phonological properties of Affixes and subsequent pages in the handout show that these general phonological properties of Affixes also determine the so-called templatic properties of the affixed reduplicant. Three phonological properties of Affixes are identified in (58). Because time is limited we'll only discuss these briefly, but we will be calling on the same basic theoretical tools – especially ranking and emergence of the unmarked – that we use in dealing with the Stem-sized reduplicant.

First of all, Affixes in general are subject to size and weight requirements. These points are made in (59) and (60) on the handout. Affixes are small, typically no bigger than a single syllable, and they are sometimes further restricted to lightness or heaviness under various conditions. It almost goes without saying that these same characteristics are found with the Affixed reduplicant. Monosyllabism and weight requirements have always been important in the templatic description of reduplicative Affixes. The point here is that monosyllabism and weight requirements can now be related to the cross-linguistic properties that may hold of any Affix. So, in other words, we can understand this result – the properties of small reduplicative Affixes, if you like – without some Prosodic-Morphology-specific apparatus like a template. Affixes of any kind – reduplicative or not – can exhibit size and weight requirements.

Now look at (61) on the handout. There's another aspect of Affixes in general that's even more obvious – they're unmarked in comparison to roots. We often find that the structure of Affixes is segmentally or syllabically simpler, with fewer contrasts than the structure of roots. This seems to be common wisdom in phonological circles.

What does it mean to say that Affixes are unmarked relative to roots? In Optimality Theory, it means that in some languages only the Affixes obey constraints that are obeyed by both roots and Affixes in other languages. In Optimality Theory, unmarked structure can be a property of whole languages, if the responsible constraint is undominated. But if that same constraint is lower ranking, it might be true of only certain domains, which are singled out by ranking with respect to other constraints. (61) explains how a constraint can hold only of Affixes in terms of meta-constraint on ranking involving an Affix-specific faithfulness constraint. What's important, rather than the details, is that the constraints involved, such as NO-CODA or NO-LONG-VOWEL in (62), are just exactly the general conditions responsible for linguistic markedness everywhere. They aren't Affix-specific constraints and they aren't reduplication-specific constraints. Just as these constraints, such as NO-CODA and NO-LONG-VOWEL or other constraints on linguistic markedness, can hold of Affixes in general, so too can they hold of reduplicative Affixes only, through domination of MAX, using exactly the same technique that we used in the analysis of Diyari.

A number of examples of this type are documented on pages 11-13 of the handout; for lack of time, we will discuss just one of them now – Nootka in (69) and (70). Nootka is one of several languages treated by Pat Shaw in her important 1992 NELS paper. The paper argues that reduplicative templates much have access to a richer prosodic vocabulary than a simple light/heavy syllable distinction. Significantly, Shaw and Stonham point out that the Nootka reduplicant may be light or heavy, but it can never end in a consonant. They propose a structural, templatic way of describing this situation in Nootka and similar situations in other languages, involving structural differentiation of the syllable nucleus.

Instead of elaborating the theory of templates in structural terms, we want to argue here that syllabic constraints are responsible for facts like these, just as they are responsible for unmarkedness in language typology or for the unmarkedness of Affixes. The essential tool used is emergence of the unmarked, through a ranking like the one in (70). We have a comparison between a CVC reduplicant in (70a) and a CV reduplicant in (70b). The CVC reduplicant is a more exact one – that is, it better satisfies MAX than the CV reduplicant – but at the expense of violating NO-CODA. If NO-CODA dominates MAX, then there can be no choice but for the CV reduplicant to be optimal and for the CVC reduplicant to be rejected. (Notice that we cannot escape this particular argument by putting a weight condition on the reduplicant. We cannot insist that the reduplicant must be light in Nootka for the reasons pointed out by Shaw and Stonham, namely cases like (69b).)

Tableaux (71) and (72) go on to show how other structural properties of the Nootka reduplicant can be derived without a template, but rather through interaction with general constraints on Affixes and general constraints on syllabic structure.

There is a final point to be made on unmarkedness in the reduplicant. Steriade (1988) is responsible for the basic insight that aspects of reduplicant structure, such as the lack of a coda, are unmarked properties. But Steriade's formulation of this idea involves an apparatus of reduplication-specific truncation rules. These rules, for example, delete codas or shorten long vowels.

The analysis we've given here, in fact, the whole point of the talk, involves no reduplication-specific apparatus. The constraint NO-CODA, which determines the structure of the reduplicant in Nootka, is exactly the same constraint that determines the structure of the entire Hawaiian language, where it is undominated. It's not a different constraint. It is the same constraint that might be applied to Affixes in some other language, through domination of the affix-specific PARSE constraint. Markedness in the reduplicant is the same – formally and factually – as markedness in language generally. It needn't be the same as it is in the host language, but it is the same in **language**. Furthermore, reducing the reduplication-specific machinery still further, we've argued that the unmarkedness of reduplicative Affixes is paralleled by the unmarkedness of all Affixes, in comparison to roots, and we've given an account of that in terms of constraint ranking.

This is the time to wind-up. Let's turn to Section 4 on page 16. The argument that we've made has the following three points. First of all, the goal of Prosodic Morphology is the discovery of independent general principles that are going to govern the properties of reduplication and root-&-pattern systems, and circumscription, truncation and the like. The most independent and most general such principles are going to be those that are not specific to Prosodic Morphology at all, but in fact are exactly the principles that are needed to describe every domain of the morphology and the phonology.

We have argued that templatic requirements, which are one important aspect of Prosodic Morphology, follow from hierarchies of constraints of exactly that type – that is general constraints of language, many of them understood through alignment theory. Finally, and most significantly for the overall content of the talk, we've argued that the properties of reduplicative templates can be reduced to saying whether the reduplicant is a Stem or an Affix. The rest will follow from independent principles.

Overview of Prosodic Morphology

Part II: Template Satisfaction

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1. Introduction

(1) Goal of Prosodic Morphology

To explain properties of morphology/phonology dependency in terms of *independent, general* principles.

Part I: Templatic forms emerge from hierarchies of constraints, on alignment and other general properties of affixes and stems. Role of special PM-specific constraints in characterizing templates is minimized or eliminated completely.

Part II: Template satisfaction also follows from hierarchies of constraints. These constraints are not specific to templates, but instead are related directly to constraints on Faithfulness.

The aim is to recover the original idea that template satisfaction follows general autosegmental principles (McCarthy 1979, 1981, Marantz 1982, Yip 1982, N. Smith 1985, 1986, Mester 1986, Clements 1986, M&P 1986, etc.).

(2) Focus: On two issues:

- Constraints responsible for base/reduplicant matching.

(Continues theme of M&P 1993, 1994, harking back to Goldsmith 1976, Clements & Ford 1979, McCarthy 1979, Marantz 1982, etc.)

- Parallels between base/reduplicant constraints (on “copying”) and input/output constraints (Faithfulness).

2. Empirical Issues

- Properties of inexact reduplicants.

- Parallels to breaches of *Faithfulness* in the input/output relation.

Many examples will be drawn from Makassarese, on which all information and the basic understanding comes from Aronoff, Arsyad, Basri and Broselow 1987. For full analysis, see M&P 1994.

(3) Partial reduplication itself as inexactitude. Parallel: Deletion.

- In Makassarese, e.g., partial reduplication is found whenever total reduplication would violate the high-ranking restrictors on Stem and PrWd, which demand disyllabicity (cf. Diyari).

E.g., *manaʔ-manára*, not **manara-manára*.

- Partial reduplication is paralleled in the domain of input/output relations by *deletion* (identified as PARSE-violation in P&S 1993).

A special case of partial reduplication involves copying and non-copying of segmental quantity (transfer — Levin 1983, Clements 1985, Mester 1986, Hammond 1988, M&P 1988, Steriade 1988, Dell and Elmedlaoui 1988). Phenomena like closed syllable shortening parallel this in the input/output domain.

(4) Fixed default segmentism in the reduplicant. Parallel: Epenthesis.

- In Makassarese, the reduplicant shows the fixed final default consonant ʔ, regardless of the matching consonant in the base, or even when there is no matching consonant in the base at all:

manaʔ-manára, *balaʔ-balao*.

- Likewise, in Yoruba (Akinlabi 1984, M&P 1986, Pulleyblank 1988), the fixed default vowel *i* is found in the reduplicant: *ghigbona*.

- Fixed default segmentism in the reduplicant is paralleled in the input/output domain by *Epenthesis* (identified as FILL-violation in P&S 1993).

- (5) **Special treatment of reduplicant-internal string.** Parallel: Internal resistance to Epenthesis/Deletion.
- **A peripheral NOCODA effect.** Balangao (Shetler 1976) has the usual MinWd-sized reduplicant, analyzed as in Diyari and Makassarese: *ma-nagta-tagta-tagtag* 'running everywhere or running repeatedly'.
 - The reduplicant must be V-final, though codas are permitted generally.
 - This shows that NO-CODA is active in determining the structure of the reduplicant.
 - ▶ Why then not **tata-tagtag*, which satisfies NO-CODA even better than *tagta-tagtag*?
 - *Contiguity of copying* in the middle of the reduplicant is the operative factor.
 - **Contiguity** restricting epenthesis/deletion.
 - Axin. Campa, Lardil augmentation is external: naTA , *nATa /// řilTA , *řATil , *řiTAl.(M&P 93a)
 - In Chukchee (Kenstowicz 1993, Spencer 1993), morpheme-edge epenthesis is preferred to morpheme-internal epenthesis: /miml+qaca+n/ → *mimləqacan*, **miməqacan*.
 - In Diyari (M&P 1994), NO-CODA leads to deletion of word-final consonants, but not of word-medial ones, with the effect that all words are vowel-final.(Similarly, Kenstowicz 1994 on Korean cluster simplification.)
- (6) **Special treatment of edges.**
- In Makassarese, the reduplicant is identical with the *initial* substring of the base, but not necessarily with the final substring: *mana?-manara*, **nara-manara*. This is the usual pattern in prefixing partial reduplication, with the reverse in suffixing partial reduplication (Marantz 1982).
 - Edge anchoring is conspicuous in the domain of Faithfulness, where it is analyzed by Alignment constraints on the morphology/prosody interface (Prince and Smolensky 1991, 1993; M&P 1993ab).
- (7) **Failure of reduplicative identity for general phonological reasons.** Parallel: deep–surface disparity.
- In Makassarese, the reduplicant and base can differ with respect to nasal place assimilation, a general phonological process of the language: *bulan-bulaŋ*, **bulaŋ-bulaŋ*.
 - ▶ If phonology and reduplication proceed in parallel (M&P 1993a), then this lack of identity is reckoned with in the matching between reduplicant and base.
 - The parallel in the faithfulness domain is a direct one: these same phonological alternations in the language as a whole lead to unfaithful parsing of inputs, so that e.g. the place features of a nasal are not faithfully parsed before a stop.

3. Reduplicative Identity ≠ Faithfulness of Parsing

- (8) **Parallel ≠ Same.** Despite these parallels and similarities of function, the reduplicative identity constraint MAX cannot be *the same* as the faithfulness constraint PARSE (M&P 1993a, 1994).
- All of the arguments but the first will rest on *emergence of the unmarked* (cf. Part I), and include:
- (9) Incomplete Copying vs. Phonological Epenthesis in Axininca Campa
- In Axininca Campa: PARSE, ONSET > FILL, so hiatus leads to epenthesis:
 - /iŋkoma+i/ → iŋkomaTi, **iŋkoma(i)*.
 - But in reduplication, ONSET > MAX, leading to partial copying, not a default consonant:
 - /osampi+RED/ → osampi-sampi, **osampi-Tosampi*.
- (10) CODA-COND effects in Balangao (Nootka, etc.)
- In Balangao as a whole, CODA-COND is not visibly active, so: PARSE, FILL > CODA-COND. (Faithfulness can force parsing into coda position.) Hence, Balangao has codas.
 - But CODA-COND is active in the reduplicant, because CODA-COND > MAX, leading to less-than-full copying: *tagta-tagtag*, **tagtag-tagtag*.

(11) The γ -Default in Tübatulabal (M&P to appear; cf. Crowhurst 1991ab)

•In Tübatulabal, the reduplicant always begins with a γ , whatever the base-initial consonant is:

γ i-pitita, γ a-kamīŋ, γ a-maŋa.

•But in the language as a whole, consonants aren't simply replaced by γ .

•So “substitution” of default γ is possible only when exactness of copying is at stake, not when the trade-off is with faithfulness of parsing in the input/output relation.

▶ The constraint that favors γ *dominates* MAX, but is crucially dominated by PARSE.

(12) The Minimal PrWd Reduplicant in Makassarese (Diyari, etc.)

•The [RED]_{Stem} reduplicant of Makassarese is a PrWd, for reasons explored in Part I.

It is the *minimal* PrWd, because it also obeys ALL-FT-RIGHT and PARSE-SYLL, which dominate MAX.

•But in the language as a whole, where faithful parsing is at issue, ALL-FT-RIGHT or PARSE-SYLL must be violated by any PrWd longer than two syllables, in satisfaction of higher-ranking PARSE-SEG.

▶ **PARSE-SEG** > PARSE-SYLL, ALL-FT-RIGHT > **MAX**

(13) **Summary**

•Though there are direct formal parallels between the base/reduplicant copying relation and the input/output faithfulness relation, there are also important differences.

•In every case cited, the constraints requiring completeness of the reduplicant/base relation (MAX) and the output/input relation (PARSE) are provably distinct, since they are differently ranked.

•Below we develop an approach in which the similarities between the two constraint types are expressed formally, through the notion *correspondence*. Yet the distinctness is still recognized.

•This situation is typical in OT, where constraints have been shown to come in families. E.g., the various constraint-types subsumed under Generalized Alignment (M&P 1993b) are also distinct, but formally related.

4. The Theory of Correspondence

(14) **The Approach.** To capture the connections and still leave room for the differences, we need a way to generalize over identity relations — base/reduplicant, input/output, stem/stem (in root-and-pattern, circumscriptive, and truncatory morphology). To that end we define the notion *correspondence*.

(15) **Correspondence**

Given two strings S_1 and S_2 , related to one another as reduplicant/base, output/input, etc., *correspondence* is a function f from any subset of elements of S_2 to S_1 .¹ Any element α of S_1 and any element β of S_2 are *correspondents* of one another if α is the image of β under correspondence; that is, $\alpha=f(\beta)$.

Role of Correspondence in Gen

Each candidate pair (S_1, S_2) comes from Gen equipped with a correspondence relation between S_1 and S_2 that expresses this dependency between the elements of S_1 and those of S_2 . Each reduplicative morpheme has a correspondence relation between the Reduplicant R and the base B: (R,B). Each output candidate O comes supplied with a correspondence relation between itself and the corresponding input I: (O,I). There are distinct correspondence functions for different reduplicative affixes, for input/output, and for other domains in which this relation is applied.

¹We will simplify the discussion in two respects. First, we will deal with S_1 and S_2 as strings, rather than full autosegmental/metrical/feature-structure entities. For formal development relevant to the full complexity of phonological structures, see Pierrehumbert and Beckman 1988, Kornai 1991, van Oostendorp 1993. Second, we will speak of f mapping from string to string, while a function properly runs from *set* to *set*. To remedy this imprecision, observe that a string can be regarded as a function from some alphabet ALPH into (say) an initial segment of Z^+ with the usual ordering $<$ on it. So, a string Σ is isomorphic to a set $S = \{(c,i): c \in \text{ALPH}, i \in Z^+\}$, where $a_j \sim a_k$ in Σ iff $(a_j, m), (a_k, m+1) \in S$. We can define f over such sets.

(16) Hypothetical Illustrations

a. Some R/B Correspondents

<u>bad</u> – <u>bad</u> upi	(R-initial <i>bad</i> corresponds to B-initial <i>bad</i>)
<u>ba</u> – <u>ba</u> dupi	(<i>b</i> in R has no correspondent in B)
<u>ba?</u> – <u>ba</u> dupi	(? in R has a non-identical correspondent in B)
? <u>a</u> d– <u>ba</u> dupi	(? in R has no correspondent in B)
to? <u>a</u> d– <u>ba</u> dupi	(no element of R has a correspondent in B)

b. Some I/O Correspondents

/pau <u>kt</u> a/	[<u>pa.uk.ta</u>]	(a fully faithful parse)
/pau <u>kt</u> a/	[<u>pa.u.k</u> i. <u>ta</u>]	(dominance of NO-CODA, with V-epenthesis)
/pau <u>kt</u> a/	[<u>pa.</u> ? <u>uk.ta</u>]	(dominance of ONSET, with C-epenthesis)
/p a <u>uk</u> ta/	[<u>puk.ta</u>]	(dominance of ONSET, with V-deletion)

►Notation. Elements in correspondence are double-underlined. (Subscripting is more exact, but opaque.)

NB: As shown in these examples, epenthesis and deletion are now given a literal interpretation in terms of elements added to or missing from candidate forms. They are identified through correspondence, or the lack of it. This is a departure from the Containment-based practice in P&S 1993, which assumes that epenthesis and deletion are matters of over- or under-parsing only.

(17) Role of Correspondence in Eval

- Constraints demand correspondence (or the lack of it) under various conditions.
- Formally identical constraints on (R,B) and (O,I) correspondent-pairs give rise to the observed parallels between reduplicant/base identity and input/output faithfulness.

(18) Some terminology and notation (informally specified)

Given $f: S_1 \rightarrow S_2$,

- the *domain* of the function f — $\text{Dom}(f)$ — is the set of elements that f is defined for or “applies to” (S_1).
- the *range* of a function f — $\text{Range}(f)$ — is the set of elements produced by the function, a subset of S_2 .
i.e. the set of y 's in S_2 such that $y = f(x)$.
- correspondents are co-indexed when it is necessary to clarify precisely what the correspondence relation must be for a given candidate pair; otherwise double-underlining is used as an informal guide.

5. The MAX/PARSE Pair of Constraints on Correspondence

(19) MAX (R,B) / PARSE² (O,I).

Every element of S_2 in (S_1, S_2) has a correspondent in S_1 .
 $\text{Range}(f) = S_2$.


►In the (R,B) domain, MAX is satisfied by total reduplication, in which every element of the Base (S_2) stands in correspondence with some element of the Reduplicant. Every element of the Base is in $\text{Range}(f)$.

- Partial reduplication constitutes a violation of MAX, since $\text{Range}(f)$ is a *proper* substructure of S_2 .
Some elements of the Base do not have a correspondent in the Reduplicant.

►In the (O,I) domain, PARSE is satisfied when there is no deletion, since every element of the Input (S_2) stands in correspondence with some element of the Output.


²This is the constraint sometimes dubbed PARSE-SEG, identical in its effects to the original PARSE of P&S 1991, 1993. It should not be confused with PARSE-SYLL or PARSE-feature, which are significantly different in their effects.

(20) “PrWd Restrictors” > MAX, in Makassarese, from /RED+manara/

Candidates	“PrWd Restrictors”	MAX
a.  <u>mana</u> ? <u>manara</u>		*
b. <u>manara</u> <u>manara</u>	* !	

•“PrWd Restrictors” are the constraints responsible for the MinWd reduplicant: PARSE-SYLL, ALL-Ft-RIGHT/LEFT.
 ▶They force violation of MAX: partial reduplication.

(21) PARSE > “PrWd Restrictors”, in Makassarese, from /manara/

Candidates	PARSE	“PrWd Restrictors”
a.  / <u>manara</u> / , [.ma.(na.ra.)]		*
b. / <u>manara</u> / , (.na.ra.)	* ! *	

•In (b), the unfootable syllable *ma* is simply without a correspondent in the output, better satisfying the PrWd Restrictor PARSE-SYLL, which requires that every syllable be footed.

▶The price to be paid for this greater metrical harmony is too high here —

Violation of PARSE, which requires that every element of the input have a correspondent in the output.

(22) The Distinctness Argument

•These two tableaux complete at the level of formal detail the argument made informally in §3 above: exactness of copying and faithfulness of parsing are governed by distinct constraints, separately rankable.

•In Makassarese, it is a fact that **PARSE > PARSE-SYLL > MAX**.

From this, it follows that PARSE and MAX must be different constraints; though formally parallel, through the general notion of *correspondence*.

▶**Differentiation of PARSE and MAX** in all the other examples cited above in §3:

•In Axininca Campa: **PARSE, ONSET > FILL > MAX**.

Thus, the possibility of V+V hiatal juncture leads to C-epenthesis, except in reduplicative contexts, when it leads to under-copying.

•In Balangao: **PARSE > NO-CODA > MAX**. Thus, NO-CODA is violated in the language as a whole, but obeyed (non-medially) in the reduplicant, yielding *tagta-tagtag* over **tagtag-tagtag*.

•In Tübatulabal: **PARSE > *C-PLACE > MAX**. The constraint *C-PLACE favors Place-less *ʔ* as the default consonant. Through domination of MAX, it leads to non-copying of Place-full consonants:

/RED+p̄it̄ita/ → ʔ̄i – p̄it̄ita.

▶But it cannot lead to non-parsing of Place-full consonants generally, in non-reduplicative contexts, else they would all map to *ʔ* in the output! (I.e. no general C-ʔ correspondence in the lg.)

(23) **A Flawed Alternative**. Instead of generalizing *correspondence*, it is possible to go for a Full-Copy Model of Reduplication (McCarthy 1986, Marantz 1982, M&P 1987, Steriade 1988). Here, the familiar Faithfulness constraints PARSE/FILL etc. would be distinguished from R-PARSE, R-FILL, R-FAITH in general. R-PARSE ≈ MAX ≠ PARSE.

★Full-Copy gets Redup/Base identity, and degrees of identity, from Copy(Base) followed by Rules(Copy(Base)). Redup *resembles* Base because it starts out *as* the Base and *Rules* are costly. (NB. Derivational, bottom-up conception.)

▶But Reduplicant form can influence Base form: constraint flows both ways along the correspondence linkages.

•Tag: paŋ-RED-putul → pa-Mu-Mutul, for M=ŋ+p. Samoan: paasi-RED_{stem} → pAsi-pAsi (Levelt 1993).

■Only parallelistic *correspondence* predicts these effects. (Cf. also M&P 1993a,ch5:74 on anti-serial effects.)

★Full-Copy doesn't distinguish *lack of identity* (bulam-bulan) from *lack of correspondence* (baraʔ-barambaŋ).

•ID-lack ← general phonology. CORR-lack ⇒ reduplication-specific emergence of the unmarked. Explored below.

6. Other Constraints on Correspondence

(24) BASE-DEPENDENCE (R,B) / FILL (O,I)

Every element of S_1 in (S_1, S_2) has a correspondent in S_2 .

$\text{Dom}(f) = S_1$.

►In the (I,O) domain: FILL is satisfied when there is no epenthesis, since epenthetic elements (in the output, S_1) are not in $\text{Dom}(f)$, since they lack correspondents in the input S_2 .

►In the (R,B) domain: BASE-DEPENDENCE is satisfied whenever the reduplicant contains no elements that lack correspondents in the base. It is violated by the ?-final reduplicant found with polysyllabic bases in Makassarese.

Observation on Parallelism: The ranking of BASE-DEPENDENCE and FILL is the same in Makassarese (shown below), consistent with the idea that they are literally the same constraint (unlike MAX/PARSE, which are literally different). As yet, we know of no evidence for separate ranking of BASE-DEPENDENCE and FILL in other languages.

(25) CONTIGUITY (so named in both (R,B) and (O,I) domains)

The portion of S_2 standing in correspondence forms a contiguous string, as does the correspondent portion of S_1 .

$\text{Range}(f)$ is a single contiguous string.

$\text{Dom}(f)$ is a single contiguous string.

►In the reduplicative (R,B) relation: CONTIGUITY forbids *skipping* of elements in B.

E.g. hypothet. *patu–pantudi, where the $\text{Range}(f)$ in B is {pa, tu}, two noncontiguous substrings of the base.

►It also forbids *intrusion* of foreign (non-B-related) elements inside R.

E.g. hypothet. pantu–patudi, where $\text{Dom}(f)$ in R is split as {pa, tu}.

•Observe that the exclusion of the base-ending sequence –*di* from correspondence is perfectly harmless, as it in no way interrupts the contiguity of the corresponding sections.

►The effects of CONTIGUITY are similar in the (I,O) domain — prohibiting medial deletion or medial epenthesis.

•The two aspects of CONTIGUITY — the requirements on $\text{Range}(f)$ and $\text{Dom}(f)$ — are perhaps to be differentiated, as separately rankable constraints (cf. Kenstowicz 1994). No evidence is yet known to bear on this.

Observation on Parallelism: There are no currently known cases where CONTIGUITY in the (R,B) domain is distinct and separately ranked from CONTIGUITY in the (O,I) domain.

(26) ANCHORING (R,B) / ALIGN- $\{\text{LEFT}, \text{RIGHT}\}$ (O,I)

“Any *element* at the designated periphery of S_1 has a correspondent at the designated periphery of S_2 .”

►This requires re-tooling of GA, so as to be based on element *correspondence* as well as element *identity*.

►We approach the case needed for the present argument. (We defer treatment of $\text{Edge}_1 \neq \text{Edge}_2$.)

■Let $\text{Edge}(X)$ = the element standing at the $\text{Edge} = \text{L,R}$ of X .

Let $y \sim x$ mean $y=f(x)$ or $x=f(y)$, i.e. ‘ x and y are correspondents’.

Assume also $x \sim x$. (Correspondence is reflexive).

■ $\text{ALIGN}(\text{Cat1}, \text{Cat2}, \text{Edge})$ means $\forall \text{Cat1} \exists \text{Cat2} \forall x \exists y [x = \text{Edge}(\text{Cat1}) \Rightarrow (y = \text{Edge}(\text{Cat2})) \& y \sim x]$

This merely formalizes (26. More boldly, we could assert:

a) $\forall \text{Cat1} \exists \text{Cat2} \forall x \exists y [x \sim \text{Edge}(\text{Cat1}) \Rightarrow (y \sim \text{Edge}(\text{Cat2})) \& y \sim x]$.

(27) **RED Alert.** In the (R,B) domain: we have $\text{E-ANCHORING}(\text{R,B}) = \text{ALIGN}(\text{R,B,E})$. The E-most element of R has a correspondent that is E-most in B.

•In prepositive reduplication, L-ANCHORING \gg R-ANCHORING. Vice versa for postpositive reduplication.

(28) In the (O,I) domain: Cat1 and Cat2 are morphological and prosodic constituents, respectively.

(29) Linearity guarantees that ANCHORING or ALIGN will not “swap” edges.

•In prefixing reduplication, copying favors the left peripheral element of R. Thus, Makassarese has *mana?-manara* and not **nara(?)-manara*. The same is true, *mutatis mutandis*, for suffixing reduplication.

•In the (O,I) relation, faithful parsing favors the left and right peripheral elements of each domain. Shown in Part I with Axininca Campa and here below with ALIGN-STEM-RIGHT in Makassarese (*lompo, lompo?*).

(30) LINEARITY

S₁ reflects the precedence structure of S₂, and vice versa.

For α_i, α_j ∈ Dom(f), α_i < α_j iff f(α_i) < f(α_j)

Linearity, as stated, also entails that correspondence preserves distinctness of elements — two elements of S₁ cannot correspond to a single element of S₂, nor can two elements of S₂ correspond to a single element of S₁. Any two elements of a string will stand in an order relation which is necessarily preserved under linearity. Thus, violations of linearity involve metathesis (not discussed further here).

7. Reduplication in Makassarese

(31) **Phonological Background**

- Each V heads a separate syllable (no long V's or diphthongs).
- Stress is penultimate (but epenthetic vowels are ignored).
The minimal word is disyllabic, as expected.
- The only licit word-final codas are ʔ and ŋ. Clusters consist of ʔC, homorganic NC, or geminates.
 - ▶ No contrast between ʔ+{ptk} and geminate {ptk}.

(32) Epenthesis

Roots ending in consonants other than the licit codas are parsed epenthetically:

/rantas/	rántasaʔ	`dirty'
/teʔter/	téʔtereʔ	`quick' [téʔtereʔ]
/jamal/	jámalaʔ	`naughty'

The added vowel is sufficient to parse *s*, *r*, or *l* as an onset, not a coda;

(33) **Why the final epenthetic ʔ in addition** to the epenthetic vowel?

V-final roots are parsed faithfully, with **no** epenthetic ʔ:

/lompo/	lómpo	`big'
	*lómpoʔ	

(34) CODA-COND (informally)

Codas must be geminates, homorganic nasals, ʔ, or ŋ.

On coda conditions in general and wrt geminate and homorganic clusters, see Itô (1986, 1989), Goldsmith (1990), Yip (1991), and esp. Itô & Mester (1993).

CODA-COND > FILL-V. An epenthetic vowel appears where Coda-Cond is threatened.

(35) FINAL-C

“Every PrWd is consonant-final.”

Constraints of this type are attested fairly commonly — see M&P (1990b), Piggott (1991), McCarthy (1993a). Instead of with Align, perhaps to be connected with the even more common neutralization of final weight contrasts.

(36) FINAL-C > FILL, from /rantas/

	<u>rantas</u>	FINAL-C	FILL
a.	☞ <u>rantasaʔ</u>]		**
b.	<u>rantasa</u>]	* !	*

(37) ALIGN-RIGHT


Align(Root, PrWd, Right)

“The correspondent of the rightmost element in Root is the rightmost element in PrWd.”

“The Root ends exactly at a PrWd edge.” (Prince and Smolensky 1991b, 1993; M&P 1993ab; discussion last time)


When the right edges of Stem and σ coincide, the Stem-final segment is syllable-final: *lompo* vs. **lompoʔ*.

(38) ALIGN-RIGHT > FINAL-C — Good stem-alignment isn't disrupted just to get a final consonant.

	lomp _o ₅	ALIGN-RIGHT	FINAL-C
a. 	lomp _o ₅]		*
b.	lomp _o ₅ ?]	* !	

If ALIGN-RIGHT is to be obeyed, then root-final *o* must stand in correspondence with a PrWd-final element. In form (b), it does not, because ? is PrWd-final.

(39) CODA-COND > ALIGN-RIGHT — If the stem-final consonant isn't a licit coda, then the stem is not aligned.


	rantas ₆	CODA-COND	ALIGN-RIGHT
a. 	rantas ₆ a?]		*
b.	rantas ₆]	* !	

(40) Ranking Summary

CODA-COND > ALIGN-RIGHT > FINAL-C > FILL

(41) A Featural Refinement

Compare the following candidates, which tie on all constraints introduced thus far:

		CODA-COND	ALIGN-R	FINAL-C	FILL
	<u>iamal</u> a?.	✓	*	✓	**
	<u>iamal</u> aŋ.	✓	*	✓	**

•The ? is the *default* consonant of Makassarese; ŋ is a licit coda, but not the default.

•This is because ŋ is more marked than ?.

•In OT, this means there's a *constraint* that ? obeys and ŋ violates. Then ? is *literally unmarked* relative to ŋ (Smolensky 1993). For concreteness, we introduce the following:

*[NASAL]
*[nas]

*[NASAL] isn't rankable with respect to any of the constraints above, but it's obviously dominated by Faithfulness requirements (PARSE), since Makassarese has nasals. *[NASAL] belongs to a family of constraints barring *every* feature. Aspects of their ranking *wrt each other* are universally fixed. This defines segmental markedness (Prince & Smolensky 1993: chs. 8,9; Smolensky 1993).

(42) The Makassarese Reduplication Patterns.

►Always Disyllabic. Two Classes: exact (whole based copied); and ?-final.

a. Exact Reduplication of Disyllabic Unaffixed Roots

/batu/	<u>batu</u> -bátu	`small stone(s)'
/golla/	<u>golla</u> -gólla	`sweets'
/tau/	<u>tau</u> -táu	`doll'
/tauŋ/	<u>taun</u> -táuŋ	`yearly'
/balla?/	<u>balla?</u> -bálla?	`little house'
/bulan/	<u>bulan</u> -búlan	`monthly'

b. ?-final Disyllabic Reduplication of Longer Roots

/manara/	<u>mana?</u> -manára	`sort of tower'
/balao/	<u>bala?</u> -baláo	`toy rat'
/baine/	<u>bai?</u> -baíne	`many women'
/barambaŋ/	<u>bara?</u> -barámbaŋ	`sort of chest'

c. ?-final Disyllabic Reduplication of Disyllabic Roots with Final Epenthesis

/te?ter/	<u>te?te?</u> -té?tere?	`rather quickly'	[tettettétere?]
/a?+beser/	a?- <u>bese?</u> -béseré?	`quarrel in jest'	


d. One remaining ?-final pattern, involving disyllabic C-final roots with suffix *-i*, is dealt with in M&P 1994.

- (43) **RED=STEM**. Lexical form of reduplicant is [RED]_{Stem} (cf. Part I).
 •With PARSE-SYLL, ALL-FT-RIGHT > MAX, the reduplicant must be disyllabic.

The C-Final Reduplicant


- (44) **C-finality** of epenthetic words (rantasa?) parallels **C-finality** of the RED on polysyll. Base (mana?-manara).
 •Correspondence, essential to the equivalent constraints on (R,B) and (O,I), elucidates the parallel.

- (45) FINAL-C > BASE-DEPENDENCE, from /RED+manara/
 Just as FINAL-C > FILL in (O,I) (see (35)), so too FINAL-C > BASE-DEPENDENCE in (R,B).

Candidates	FINAL-C	BASE-DEPENDENCE
a.  <u>mana</u> - <u>manara</u>	*	*
b. <u>mana</u> - <u>manara</u>	** !	

- (46) ALIGN-RIGHT > FINAL-C

Just as ALIGN-RIGHT > FINAL-C in (O,I) (see (37)), so too ALIGN-RIGHT > FINAL-C in (R,B).

RED+lompo ₁ +i	ALIGN-RIGHT	FINAL-C
a.  lompo ₂ - lompo _{1,2} +i	*	*
b. lompo ₂ ?- lompo _{1,2} +i	** !	

•The constraint ALIGN-RIGHT demands that the rightmost element of any root stand in correspondence with an element that is final in PrWd. In the base *lompo+i* it cannot; the suffix *-i* is prosodically integrated into the word. But in the reduplicant, there is a choice, whether or not to satisfy FINAL-C. In fact, FINAL-C is dominated crucially.

•Observe that correspondence is assumed to be transitive here.

- (47) ALIGN-RIGHT and ANCHORING

- The Makassarese reduplicant is invariably left-ANCHORED, as usual for a prefix.
- But ALIGN-RIGHT has the effect of right-ANCHORING the reduplicant too, though as a dominated constraint.
- Right-ANCHORING must fail when the root is longer than two syllables, because the disyllabicity restrictors PARSE-SYLL and ALL-FT-RIGHT are dominant.
- Another way to achieve both left- and right-ANCHORING would be by CONTIGUITY violation: /RED+balao/ → balo-balao. This is impossible in Makassarese, because CONTIGUITY is unviolated.
- But with low-ranking CONTIGUITY, simultaneous left- and right-ANCHORING are possible. In Malay monosyllabic reduplication (Hendon 1966, Kroeger 1989a; cf. Wee 1994), both edges are anchored:

di+RED+bele?	di- <u>be?</u> -bele?	`is repeatedly turned over'
RED+laŋ+ɛt	<u>la?</u> -laŋ+ɛt	`palate'
RED+gɔlap	<u>gɔ?</u> -gɔlap	`is repeatedly dark'
RED+diam	<u>dɨ</u> -diam	`remains silent'
RED+kawan	<u>kaŋ</u> -kawan	`friend'

This is a species of edge-in association — see Yip 1988, 1989, Hoberman 1988. (Reduplicant-final stops reduce to ? and nasals assimilate, in response to a Makassarese-type coda requirement (see Teoh 1988, Durand 1987, Gorecka 1989, Kenstowicz 1989, Trigo 1991).)

The Unmarked Segmental Structure of the Reduplicant

- The grammar also reckons with cases where there is a lack of parallelism between the behavior of the reduplicant and the behavior of ordinary stems in the language as a whole.
- Cases have been examined of the PARSE > PARSE-SYLL, ALL-FT-RIGHT > MAX interaction. Makassarese presents another case, illustrated by the following tableau:

(48) *NAS > BASE-DEPENDENCE, MAX, from /RED+barambaŋ/

Candidates	*NAS	BASE-DEPENDENCE	MAX
a. <u>ba</u> raʔ- <u>ba</u> ra mbaŋ	**	*	****
b. <u>ba</u> ra- <u>ba</u> ra mbaŋ	*** !		***

This shows that the reduplicant has a final ʔ in preference to copying a nasal from the base. In contrast to this example, with a polysyllabic root, the final nasal of a disyllabic root must copy, as required by high-ranking ALIGN-RIGHT: *bulan-bulaŋ*, **bulaʔ-bulaŋ*.

Query: But why isn't every nasal in every stem replaced by ʔ ?

Response: In ordinary stems, N - ʔ is a violation of PARSE or PARSE-FEATURE(Place), fatal if these constraints dominate *NAS. Again, this follows the logic of emergence of the unmarked.

Query: Why isn't every nasal in the reduplicant replaced by ʔ ?

Response: The correspondence constraints place limits on how far the unmarked structure of the reduplicant can be taken:

(49) LEFT-ANCHORING > *NAS

Candidates	ALIGN-LEFT	*NAS
a. <u>m</u> anaʔ- <u>m</u> ana		****
b. ʔanaʔ- <u>m</u> ana	* !	***

Form (b) is unanchored; the reduplicant does not contain a correspondent of root-initial *m*. Segmental unmarkedness is not purchased at the expense of ill-anchoring. (But compare Tübatulabal, where *C-PLACE > ANCHORING, so every reduplicant is ʔ-initial.)

(50) CONTIGUITY > *NAS

Candidates	CONTIGUITY	*NAS
a. <u>ma</u> naŋ- <u>ma</u> na		****
b. <u>ma</u> ʔ a ʔ- <u>ma</u> n a ra	* !	***

8. Correspondence and Identity

(51) **Correspondence ≠ Identity**

•Correspondents needn't be perfectly identical; e.g.:

bulan-bulaŋ in Makassarese || ʔam-bani in Tübatulabal

- Differences are not arbitrary; follow from *high-ranking* (∴ general) phonological constraints of the lg.
 - ▶Assimilation in NC clusters is pervasive in Makassarese; and likewise pervasive in Tübatulabal.
- Differences between (R,B) corresp's will be exactly the same as differences between (O,I) corresp's.
 - ▶Thus, the constraints involved must be literally the same.

(52) **Proposal.** Tie together realization of *correspondents*.

•Under the assumption that features are attributes of segments (not objects in themselves).³

(53) PARSE-FEATURE(φ)

For any segment *s* and feature φ: if *s* is a φ, then any correspondent of *s* is a φ.

NB: No literal non-parsing is involved, but we retain the traditional terminology.

- Unless PARSE-FEATURE is crucially dominated, segments in correspondence must be identical, since they must have identical featural attributes.
- If PARSE-FEATURE(φ) is crucially dominated in some segment *s*, then *s* and one or more of its correspondents differ in the value of φ.
- Through *correspondence*, PARSE-FEATURE(φ) has the same effect on (R, B) correspondents as it does on (O, I) correspondents.

³J. Pierrehumbert points out that "OCP Fusion" ≠ PARSE violation if features are attributes, a welcome result.

(54) “NC-Assimil” > PARSE-FEATURE(Place), in Makassarese, from /bam₃tu/

This is a hypothetical example, showing (via Stampean Occultation — P&S 1993) how Makassarese prohibits non-homorganic NC clusters. (“NC-Assimil” is the responsible constraint(s); see Itô-Mester-Padgett 1993 for one proposal.)

	/bam ₃ tu/	“NC-Assimil”	PARSE-FEATURE(Place)
a.	𑄎 ban ₃ tu		*
b.	bam ₃ tu	* !	

- These candidates have the same *correspondence* structure. So they both obey PARSE(seg) perfectly.
- They differ in (O,I) *identity*, because input /m/ is realized as output *n* in (a), but not in (b).
- ▶ Form (a) is optimal, because it obeys the higher-ranking constraint responsible for NC assimilation, though it violates PARSE-FEATURE(Place), since output *n* is a [coronal] that stands in correspondence with input *m*, a [labial].

(55) “NC-Assimil” > PARSE-FEATURE(Place), in Makassarese, from /RED+bulaŋ/

	Candidates	“NC-Assimil”	PARSE-FEATURE(Place)
a.	𑄎 bula _m ₅ -bulaŋ ₅		*
b.	bulaŋ ₅ -bulaŋ ₅	* !	

- These candidates show (R,B) correspondence. In (a), the segment *m*₅ stands in correspondence with the segment *ŋ*₅.
- ▶ This correspondence violates the PARSE constraint, because *m*₅ is a [Lab] that stands in correspondence with *ŋ*₅.
- **NB:** The labiality of R-final [m] in *bulam-bulaŋ* does **not** violate BASE-DEPENDENCE. BASE-DEPENDENCE is defined with respect to *correspondent elements* and, as was just argued, *m* stands in proper correspondence with [ŋ].

Compare

- In Tübatulabal ʔ_i-p_it_ita, the R-initial ʔ and the B-initial *p* **aren't** in correspondence. Thus, MAX and BASE-DEPENDENCE are violated, under domination by *C-PLACE.
- This difference is captured by the theory laid out here. It correlates with the fact that any consonant whatsoever is realized as ʔ in the Tübatulabal reduplicant, and this is a peculiarity of the reduplicant, rather than a general phonological process of the language.

(56) **Reduplication ‘Paradoxes’**. Reduplicative over- and under-application. (Munro and Benson 1973, Wilbur 1974, Anderson 1975, Aronoff 1976, Kenstowicz 1981, Marantz 1982, Carrier-Duncan 1984, Clements 1985, Kiparsky 1986, Mester 1986.)

Yoruba (Pulleyblank 1988)

- General phonological process: /n/ → l / __ non-high vowel. /ní owó/ → lówó ‘have money’
- “Overapplies” in reduplication: /RED+ní owó/ → lílówó ‘having money’.
- Assume appropriate phonological constraints: *N[–high], PARSE-FEATURE([nas])

	/RED+n ₁ í owó/	*N[–high]	PARSE-FEATURE([nas])
a.	𑄎 l ₂ í-l _{1,2} -ówó		* _(O, I)
b.	n ₂ í-l _{1,2} -ówó		* _(O, I) , ! * _(R, B)
c.	n ₂ í-n _{1,2} -ówó	* !	

(57) **Interpretation of Yoruba Tableau.**

•Form (c) fatally violates the constraint that drives the alternation. The choice between (a) and (b) is a matter of greater or lesser PARSE-FEATURE([nas]) violation. Form (b) violates it twice: *n* and *l* in (R,B) stand in correspondence, and *l* and *n* in (O,I) stand in correspondence. In contrast, form (a) violates it just once: *l* and *n* in (O,I) stand in correspondence. (Compare the analogous structural treatment of overapplication in Mester 1986, as well as precursors in Wilbur 1974.)

•This same reasoning is applicable to the Makassarese example just discussed, but cannot lead to over-application, because **bulam-bulam* violates undominated CODA-COND (only *ŋ* and *ʔ* are licit word-finally).

•More delicate assessment of (R,B) and (O,I) priority will be required for cases like Tagalog *pa-mu-mutul*, in which the reduplicant is affected and, through it, the base.

(58) **No “partial prespecification”** (as in Marantz 1982) for cases like the following:

(59) Reduplication in Nupe (Smith 1967, Hyman 1970)

/gí/	gīgí	`eating'	/gú/	gūgú	`puncturing'
/gē/	gīgē	`goodness'	/gò/	gūgò	`receiving'
/tē/	tītē	`mildness'	/tɔ/	tītɔ	`trimming'
/tá/	tītá	`telling'			

Similarly in Akan (Schachter and Fromkin 1968), Feʔ-Feʔ Bamileke (Hyman 1972), etc.

•The vowels *cannot* stand in correspondence. If they did, then the difference in height would mean a violation of PARSE-FEATURE(low) (for instance, assuming mid = [high, low]). What dominates? If **[LOW] > PARSE-FEATURE(low)*, then the language could contain only high vowels.

•Therefore they are non-correspondents. Non-correspondence (violation of MAX and BASE-DEPENDENCE) is compelled by **V-PLACE*. Like *ʔ* in Tübatulabal, the vowel in the reduplicant is a default — unmarked.

•It is straightforwardly unmarked w.r.t. height, assuming **[LOW] > *[HIGH]*.

•It is also unmarked w.r.t. rounding, since what is “unmarked” may be determined relative to a given context as well as absolutely (contra Kiparsky 1982). It is unmarked for a vowel to be round when it is near a round vowel.

•In this respect, the OT account accords very well with the proposals made in derivational terms by Schachter & Fromkin (1968) and Hyman (1972): reduplication yields a single default vowel, and other rules adjust its rounding or backness.

(60) Further Issue

Constraints on morphological structure of projection of reduplicant in base = constraints on morphological analysis of Range(*f*). Refs.: Aronoff 1988, Aronoff et al. 1987, Carrier-Duncan 1984, Cohn 1989, Downing 1994, Marantz 1987, McCarthy & Prince 1993, 1994, Mutaka & Hyman 1990, Odden and Odden 1985, Silverman 1991, Spring 1990ac, Uhrbach 1987, and others.

7. Summary of Argument

■Principles of reduplicative exactness show exact formal parallel to principles of *Faithfulness* to lexical input.

▶Both are embraced by the general theory of *correspondence*.

■Failures of featural identity in reduplication come in two species.

▶*Non-identicalbut Correspondent*. Here disparity is compelled by the constraint structure of the language as a whole: phonologically–motivated disparity.

▶*Non-identicaland Non-correspondent*. Character of intrusive elements is determined by emergence of the unmarked (the effect of universal but ½-hidden CONstraints), just as in (O,I) epenthesis.

■Excesses of identity.

▶Like (O,I) correspondence (‘Faithfulness’), (R,B) correspondence can force excess of identity, in both directions, in the face of otherwise active constraints.

□ In every case, PM is directly built from *independent, general* principles of P and M.

Transcript of "An Overview of Prosodic Morphology, Part II:
Template Satisfaction"

John McCarthy & Alan Prince

June 24, 1994

We are going to begin our talk today with a reminder of what the overall theme is. In Prosodic Morphology, we're interested in expressing the properties of morphological/phonological dependencies in independent general terms. As much as possible, maybe entirely, we want to eliminate reduplication-specific principles or constraints from the theory and from grammars. We want to derive the phenomena and regularities of Prosodic Morphology in general and of reduplication in particular from general properties of morphology or general properties of phonology or general properties of the interface between morphology and phonology.

Our goal, which is the same as the goal of all of linguistic theory, is to achieve greater empirical coverage with fewer resources – maybe with no resources at all that are specific to the domain under investigation. If we are success, then all the theoretical resources we use will be independently motivated.

The topics we chose for Wednesday and today are the form of templates and template satisfaction. Wednesday's topic was one specific piece of machinery of Prosodic Morphology, the template. A classic Prosodic-Morphology template is a morpheme of fixed prosodic shape and no segmental content. (One can't help but be impressed by Inkelas's argument on Thursday for stress prespecification, but it is clear that the classic Prosodic Morphology template is a very different object from stress prespecification. The functional differences, I think, are self-evident, and the formal differences should be apparent from our results Wednesday and today.) Let's briefly recall Wednesday's argument – it had two parts.

First, we showed that there are Prosodic-Morphological regularities that just can't be expressed templatically, except within an absurdly weak theory of templates. (This recalls an argument made in our earlier work on Arabic "Prosodic Morphology and Templatic Morphology", and is also paralleled by Itô and Mester's work in their article "Weak Layering and Word Binariness", which deals with Japanese.) For example, take the reduplicative template, so-called, of Axininca Campa. In this language, the fundamental observation is that the reduplicant is an exact copy of the root, minus the initial vowel, if any. The consonant initial root, of course, copies exactly. Some examples are shown on the blackboard [transcribed immediately below]:

kaawosi- <u>kaawosi</u>	CVVCVCV	'bathe'	osaŋkina- <u>sankina</u>	CVCCVCV	'write'
t ^h aaŋki-t ^h aanki	CVVCCV	'hurry'	osampi- <u>sampi</u>	CVCCV	'ask'
kint ^h a-kint ^h a	CVCCV	'tell'	aacika- <u>cika</u>	CVCV	'stop'
ç ^h ika-ç ^h ika	CVCV	'cut'			
tasonka- <u>tasonka</u>	CVCVCCV	'fan'			

How could you try to specify, in the form of a template, that the Axininca reduplicant is an exact copy of the root, minus the

initial vowel? You'd be reduced to something like first taking all the various CV skeleta that are observed in the form of the reduplicants (and they have to be CV skeleta in order to specify non-inclusion of the initial vowel₀, and then you sum over them to get something outrageous like CVCCVCCV.

So what we end up with is a highly specific and implausible CV string, simply to get the fact that the reduplicant can't start with a vowel. This is a self-evident loss of generalization. Minus the initial vowel, this skeleton is just exactly the biggest root that happens to occur in the lexicon of the language. And despite the arguments that Downing made for the case of Swati in her talk on Wednesday, extrametricality certainly won't help us with Axininca Campa. Prince and I present a number of empirical arguments against extrametricality as a solution for Axininca Campa in chapter 6 of our book. In sum, we're forced to conclude that there are Prosodic-Morphological regularities (such as absence of an initial vowel) that cannot be spelled-out in terms of a *templae*.

The other part of the argument last time was a specific proposal about what's going to replace templates. The focus was on reduplication, though we assume that similar techniques are going to extend to other aspects of Prosodic Morphology, such as root and pattern morphology or nonconcatenative phenomena, like those that were discussed Thursday by Perlmutter and Sandler in their talks or mentioned by Kager in some of his remarks during the discussion on Wednesday.

Our proposal is that reduplicative morphemes derive all of their templatic properties from just being a stem or an affix. Stem- or affix-hood is a kind of irreducible minimum lexical specification for any morpheme, and, we propose, it is a sufficient and complete lexical specification for reduplicative morphemes. The rest of their properties of form come from constraints on the phonology of stems or affixes that are needed generally – either in the particular language that we're studying or in other languages – with the differences to be determined by constraint ranking. This is what we referred to as the Occamite Theory of Templates. If you're interested in learning more, then we hope you'll start by reading our paper "Emergence of the Unmarked".

Now let's turn to today's topic, which is in (2) on the handout. We're going to be focusing today on two closely related matters. One of these is the issue of constraints that are responsible for base/reduplicant matching. These are the kinds of constraints that have been mentioned much in previous talks. Indeed, I think all of the talks on Wednesday called on one or more of the constraints for base/reduplicant matching. But we're also going to be discussing a larger, somewhat more abstract theoretical issue: the parallel between constraints on base/reduplicant matching and constraints on the matching between the input and output in phonology generally. These have been called constraints on faithfulness in the OT literature, starting with Prince & Smolensky's work. What we're going to try to do, following the same overall program that we used in our talk on

Wednesday, is to comprehend what happens in the base/reduplicant relation in essentially the same terms as we comprehend the relation between the input and the output in phonology. That is to say, we're going to try once more to eliminate or at least greatly reduce the reduplication-specific apparatus in linguistic theory, and at the same time hopefully improve the empirical coverage of the overall approach.

The kinds of empirical issues that we're going to address are laid out in section 2 on page 1 of the handout. The general form of the examples that appear in (3)-(6) is a combination of two things. First, they illustrate the properties of inexact reduplicants. That is, they show how base/reduplicant matching can fail, or how constraints can be violated in the matching between the base and reduplicant. Second, in each case we display a parallel to what happens in the domain of faithfulness.

The first of these cases is in (3) of this handout. That's an example of partial reduplication itself. It is paralleled in the phonology by deletion. So, for example, in the Austronesian language Makassarese, which will figure heavily in the presentation today, partial reduplication is found whenever total reduplication would violate the high ranking constraints on stem and prosodic word. (The role of these constraints is the same as in the analysis of Diyari presented on Wednesday.) So for example, we find incomplete copy of the base *manara* as *mana?*, not *manara*.

Partial reduplication is paralleled in the domain of input/output relations by deletion. That is, partial reduplication is paralleled in terms of result by phonological phenomena that involve loss of segmental material.

A second area of parallelism is *fixed default segmentism*. This is the appearance of invariant segments in the reduplicant which have default (unmarked) status. It is paralleled in the domain of ordinary phonology by epenthesis. So, for example, in Makassarese again, the reduplicant shows a fixed final default consonant glottal stop – regardless of the matching consonants in the base or even if there is none – under specific conditions which will be explained later. For instance, we observe *mana?-manara* and *bala?-balao* with a reduplicant-final glottal stop which is not motivated by copying anything in the base. It is a fixed default consonant – the unmarked or default glottal stop fixed in the reduplicant, in lieu of copying.

Similarly, in Yoruba we find the fixed default vowel *i* in the reduplicant, regardless of what the vowel of the base is. So Yoruba reduplication consists of a copy of the initial consonant followed by the vowel *i*.

Fixed default segmentism in the reduplicant of Makassarese or Yoruba is paralleled in the domain of input/output relations by the phenomenon of epenthesis. This parallel is clear – an epenthetic segment is also a fixed default, and one that is not beholden to the segmental composition of the input.

Next is a slightly less obvious case of a phenomenon that occurs in reduplication and in phonology generally. It is what we call, rather awkwardly, "special treatment of the reduplicant-internal string". It is paralleled by internal resistance to epenthesis/deletion. This phonological phenomenon is less well known than epenthesis or deletion *per se*, but there is some discussion of it in recent OT literature.

For example, the special treatment of the reduplicant-internal string can be seen in Balangao, which is an Austronesian language spoken in the Philippines. In this language, we find that the reduplicant consists of a copy of the initial syllable of the base plus the first CV of the second syllable. The reduplicant never copies a coda into final position – that's the fundamental observation. So we get *tagta-tagtag* and not *tata-tagtag*. This inexactitude of reduplication is motivated by giving high ranking to the constraint No-CODA, in an account analogous to the analysis we provided for Nootka in Wednesday's talk. So, Balangao, like Nootka, has a constraint hierarchy giving a sufficiently high rank to No-CODA. This bars any coda from the reduplicant.

But then the question is, why not bar all codas from the reduplicant? That is, why not, as in (5), say **tata-tagtag*? This satisfies No-CODA even better than *tagta-tagtag*. The answer is that this is an effect of CONTIGUITY of copying – no skipping of elements in the middle of the reduplicant. (The CONTIGUITY constraint will be formulated shortly.)

This phenomenon is not restricted to reduplication. So, for example, we saw the same constraint at work in Sam Rosenthal's analysis of Hausa, presented just before this talk.

CONTIGUITY is also known to restrict epenthesis and deletion phenomena. So, for example, in Axininca Campa and in Lardil, augmentation is always peripheral, never medial. Examples are given in (5) that show this contrast. In Kenstowicz's and Spencer's work on Chukchee, it is argued that epenthesis must occur only at the edges of morphemes, never internally to morphemes. Finally, a more complex argument can be made to explain why words must end in vowels in Diyari. (See "Emergence of the Unmarked" for a sketch of the argument.)

Another phenomenon that is very well known in both reduplication and in phonology more generally is the special treatment of edges. In the domain of the relation between the reduplicant and the base, we find that if the reduplicant is prefixed, it is identical with the initial substring of the base, and the same, *mutatis mutandis*, with a suffixed reduplicant. This is the usual pattern of prefixing reduplication, known since the work of Marantz. The parallel in the domain of input/output relations was seen in virtually every talk we've heard in the last few days: alignment constraints on the prosody/morphology interface. Align(MCat, PCat) leads to special treatment – typically faithful parsing, like accurate copying – of peripheral segments. A case that is most recent in memory would be Itô and

Mester's analysis of German, which was presented just this morning.

In (7) there's a further phenomenon that we're going to address in this talk: the failure of reduplicative identity for general phonological reasons. This is paralleled by deep surface disparity in the domain of input/output relations.

An example of this in Makassarese – the reduplicant and the base differ with respect to nasal place assimilation a general phonological process of the language. So, for example, /bulaŋ/ copies as *bulam* in *bulam-bulaŋ* because the final nasal of the copy is followed by the initial *b* at the base. This general phonological process of Makassarese interferes with identity between the reduplicant and the base. If phonology and reduplication proceed in parallel, then this lack of identity has to be reckoned with in the matching between the reduplicant and the base. There's a clear parallel in phonology: imperfect featural identity between input and output is observed routinely in phonological alternations.

What we know so far is that there are many constraints on the similarity or connection between the reduplicant and the base, and that these constraints, which have somewhat specific properties, are paralleled precisely by constraints on the relation between the output and the input – that is, by constraints on faithfulness. To have these two kinds of constraints lying around in linguistic theory unconnected with each other is an intolerable situation, and it is one that we hope to address in this talk. We will not see these constraints as unconnected -- exhibiting an amazing coincidence of properties -- but rather we will supply a way of relating them directly.

One important point that needs to be made here is this: though there are parallels between these types of constraints, they cannot be entirely identical to one another. In order to show the two constraint-types are not literally identical in Optimality Theory, it is necessary to show that in at least one language they are ranked separately. That is done by putting the two constraints into direct conflict or, if that is impossible, by finding a constraint that lies between them in ranking, relying on the transitivity of constraint domination to make the argument. The data in (9), (10), (11) and (12) show exactly the latter – there are transitive rankings of constraints which show that identity between the reduplicant and base must be enforced by constraints that are distinct from the constraints on identity between the input and the output.

To see this, let's examine just one of the examples cited on the handout, (9) from Axininca Campa. PARSE and MAX are the parallel constraints involved here. Both of them require full expression: PARSE requires full expression of the input in the output, and MAX requires full expression of the base in the reduplicant. PARSE and MAX are separately ranked in Axininca Campa as shown by how they interact with the constraint ONSET. When we deal with the situation of ONSET and PARSE interacting – ONSET does not lead to violation of PARSE, it instead leads to violation of

FILL. You can see that in the first bullet under (9) where /inkoma+i/ becomes *inkomati* not *inkoma(i)*. On the other hand, when ONSET encounters MAX, the constraint responsible for exactness of reduplication, it leads to incomplete copying; it does not lead to epenthesis. So, ONSET compels violation of MAX but PARSE does not compel violation of ONSET. Therefore we have the ranking PARSE > ONSET > MAX, showing by transitivity that PARSE > MAX. This means, as we set out to show, that PARSE and MAX must be distinct constraints, because they are separately ranked.

If you turn over the page of the handout and look at (12), it will recall to you an argument that we made in the talk on Wednesday. It was based on Diyari, though it can equally well be based on Makassarese. The argument involves the rankings among PARSE, MAX and the constraints that are responsible for the disyllabicity of the reduplicant – namely, ALL-FT-RIGHT or ALL-FT-LEFT and PARSE-SYLL. Through domination of MAX, these latter constraints lead to disyllabicity of the reduplicant, even at the expense of incomplete copying. But words of the language in general are not disyllabic. Therefore, we can conclude that PARSE must dominate those same constraints.

So, to sum up, as you can see in (13), we've established the following results: though there are direct formal parallels between constraints on the base/reduplicant copying relation and constraints on the input/output faithfulness relation, there are also important differences. In every case cited in (9-12), the constraints that require completeness of the reduplicant/base relation and completeness of the output/input relation – that is MAX and PARSE – are provably distinct because they are separately ranked.

What we are going to do now is develop an approach in which the formal similarities between these two constraints-types are expressed, through a notion we call *correspondence*, yet their distinctness is still recognized. This is a situation which is quite typical in Optimality Theory, where constraints have been shown to come in families. An example, of course, is the family of constraints on alignment (or the constraints on sonority mentioned several times today as in Itô and Mester's talk). These constraints are distinct from one another, separately rankable but formally related.

The approach we are taking is laid out in (14). We want to capture the connections and still leave room for the differences. In order to do this, we need a way to generalize over identity relations of all kinds: not just base/reduplicant, or input/output, but also the identity between stem/stem in root-and-pattern morphology.

We propose to do this through introducing the notion of *correspondence*. It is a way of setting up a relation between two strings. So we have a string here and a string here – this one is the reduplicant – this one is the base – this one is the output – this one is the input, and *correspondence* is a relation between elements of one and elements of the other – the direction being unimportant. You can think of the two strings as being (partly)

co-indexed with each other. So, various elements of the reduplicant are co-indexed with various element of the base. Usually, we won't bother with showing the indices and we'll just use double underlining to highlight the things in the reduplicant that stand in correspondence to members of the base or the things in the output that stand in correspondence to things in the input.

The way this is going to work is that Gen is going to supply candidates in their output form, together with their correspondence relations. So Gen is going to show us what elements of one representation stand in correspondence with what elements of some other representation. When Gen constructs a reduplicant, it will construct a reduplicant that shows the correspondence between the elements of the reduplicant and the elements of the base that are in correspondence with it. That's the basic idea.

The picture in (16) helps, I think, to explain how this is going to work. (16a) shows you some hypothetical correspondences between the reduplicant/base. (Remember that we are dealing with here are some candidate outputs of Gen, not with actual forms of any language.)

The first example in (16a) bad-badupi show us a sort of CVC reduplication where *b* of the reduplicant stands in correspondence with *b* of the base and so on for the other two segments. In the base, the sequence *upi* does not stand in correspondence with anything in the reduplicant. This is obviously incomplete reduplication – a violation of MAX. There are things in the base that aren't in correspondence with things in the reduplicant. And that is going to be the general strategy for dealing with all of these constraints – to say here is the base, here is the reduplicant and what's the correspondence relation between them? What are the things in the base or in the reduplicant that are and aren't in correspondence with one another?

Gen, of course, has its usual freedom to do things that might not make sense as actual outputs, but the constraints are going to deal with this very successfully. So, for example, in the second example under (16a), Gen has emitted a candidate in which the initial *b*'s, though they happen to be identical to each other, do not stand in correspondence. This is to emphasize, as usual, the freedom of analysis that Gen must have.

In the third example in (16a), Gen has given us a candidate in which the correspondents are not identical to one another. So a glottal stop is standing in correspondence to a *b*. This situations is also governed by constraints of the language in which these particular cases are embedded. And in the next example, the glottal stop is not in correspondence, by way of contrast.

Now if you look at (16b) you see that the same relations hold between input and output, under this conception of things. So, for example, given the input /paukta/, one way to parse this – to use the Prince and Smolensky terminology – is fully

faithfully, with all of the elements of the input standing in correspondence to elements of the output. That's *pa.uk.ta* or (diphthongal) *pauk.ta*. Another way to parse it is epenthetically, in which there is an element of the output which does not stand in correspondence to an element of the input. The epenthetic vowel *i* in the second example is one such non-correspondent element of the output, and the epenthetic glottal stop in the next example is another.

The final case, in which the output is *puk.ta*, is one where the elements of the output all stand in correspondence to the elements of the input. But there are elements of the input that do not stand in correspondence to elements of the output. This is, of course, a case of deletion.

It is important to note here, as you can see from the examples in (16b), that epenthesis and deletion are now being given a literal interpretation in terms of elements that are added to or missing from candidate forms. They are identified through correspondence or the lack of it, rather than through non-PARSING or non-FILLING. This is a departure from the Containment theory of Prince and Smolensky (1993).

A final point about correspondence is in (17). What's its role going to be in Eval? I have already answered this, in a sense. The constraints are going to demand correspondence or perhaps the lack of it under various conditions. There are going to be formally identical constraints on the reduplicant/base domain, the output/input domain, and others. These constraints on correspondence give rise to the observed parallels between reduplicant/base identity and input/output faithfulness.

Turning to section 5 of the handout, let's begin to consider the details of these constraints on correspondence, starting with the MAX/PARSE pair. These are perhaps the easiest constraints to deal with, and what they say is something like this (we are not going to dwell on the formalization here): every element of the base has a correspondent in the reduplicant. That's MAX. Every element of the input has a correspondent at the output, that's PARSE. (And so on, as the general notion of correspondence is extended to other domains, such as mapping of a root to a template.)

Therefore, MAX is satisfied only by total reduplication, in which every element of the base does indeed stand in correspondence with some element of the reduplicant. Partial reduplication constitutes a violation of MAX, since there are elements of the base which do not stand in correspondence with elements of the reduplicant. In the domain of input/output, PARSE is going to be satisfied whenever there is no deletion, because in that case every element of the input stands in correspondence with some element of the output.

The application of MAX and PARSE, understood in the sense, and the distinction between them, are the subject of (20)-(22) on the following page of the handout. In tableau (20) we see violation of MAX through incomplete reduplication. The comparison

is between (20a), a candidate with partial reduplication, and (20b), a candidate with total reduplication. As we argued in the analysis of Diyari in Wednesday's lecture, the constraints which are referred to here as the "Prosodic Word Restrictors" (that is, PARSE-SYLL and ALL-FT-RIGHT) crucially dominate MAX, leading to the minimal word size reduplicant.

(20a) is in violation of MAX because the segments *ra* of the base have no correspondents in the reduplicant. (20b), in contrast, obeys MAX because every element of the base has a correspondent in the reduplicant. (20a) is optimal because it obeys the constraints PARSE-SYLL and ALL-FT-RIGHT more perfectly than the total reduplicating candidate (20b). As long as the Prosodic Word Restrictors dominate MAX, (20a) must be optimal.

The situation is different, though, for the relation between the Prosodic Word Restrictors and the other constraint on correspondence that we're discussing at this point, PARSE. This is shown by tableau (21), where the comparison is between two candidate pairs of output and input. In (21a) we have the pair of /*manara*/ as input and *manara* as output. In (20b) it is the pair of /*manara*/ as input and *nara* as output.

You'll recall that we no longer assume Containment. In (20b) the segmental sequence *ma* of the input is not PARSED. That is, it is present in the input but has no correspondent in the output – a violation of the constraint PARSE.

In (21a), in contrast, all segments are PARSED – that is all segments of the input have correspondents in the output. But the Prosodic Word Restrictors are violated, since the syllable *ma* of the output is not footed. Nonetheless, (21a) is optimal because, as this tableau argues, PARSE dominates the Prosodic Word Restrictors.

(22) sums up a significant further result of the distinction between PARSE and MAX. These tableaux complete, at the level of formal detail, an argument that was made earlier concerning the distinctness of these two kinds of constraints on correspondence. One holds of input/output correspondents – PARSE. And one holds of reduplicant/base correspondents – MAX.

In Makassarese, as we've seen, PARSE dominates the constraint PARSE-SYLL, one of the Prosodic Word Restrictors which itself dominates MAX. From this it follows that PARSE and MAX must be different constraints, since they are ranked differently. Nonetheless they are formally parallel, and that formal parallel is expressed through the general notion of correspondence (in fact, through the definition we saw back in (19)).

Before we end this section, there's one last point to be made. And that concerns a comparison between this overall approach to the MAX/PARSE distinction through correspondence and the very different treatment which is sketched in (23), at the bottom of page 5.

The idea of this alternative approach is to make a full copy of the base and then control the realization of the base and the copy with separate faithfulness constraints. In other words, the base is subject to the familiar PARSE constraint, while the reduplicant has its own special PARSE constraint, R-PARSE, which is more or less like MAX. Thus, incomplete copying is a result of non-parsing.

Full-Copy doesn't use correspondence at all. Instead, it gets reduplicant/base identity (or the lack of reduplicant/base identity) from first making a copy of the base and then subjecting the copy to rules or constraints which may shorten it.

Let's compare these approaches. As we've sketched it here, correspondence is an inherently parallel notion. This means that it makes sense within a theory that is non-derivational, a theory that assumes that phonological and even morphological processes take place in parallel. But the Full-Copy model sketched in (23) is inherently derivational or bottom-up. You first make the copy, then you attack it. And that's the downfall of Full-Copy. Parallelism is necessary in the reduplicant/base relation if we are to explain cases where the reduplicant affects the base in top-down fashion. Two examples of this are cited briefly on the handout in (23). In Tagalog, the nasal substitution process (whose Indonesian congener was analyzed by Joe Pater in his talk yesterday) affects the affix and through the affix it affects the base. In essence, the base copies the affix rather than the other way around. And in Samoan, as Clara Levelt has shown, the base is shortened to bring it into conformity with the bimoraic-foot shape of the reduplicant, when the base is heavy-light. These are top-down effects. They're impossible in the Full-Copy model, which sees reduplicant/base identity as a uni-directional, bottom-up influence.

Another problem with Full-Copy is mentioned at the bottom of page 5 and will become clearer in section 8 of this talk.

Now that we've discussed the basic notion of correspondence and the MAX-PARSE pair, what about other constraints on correspondent elements? Those are laid out on page 6 and the top of page 7 on the handout. We are going to take these in an order different than they're presented on the handout in order to present the constraints that we'll be using most heavily last.

The first constraint we will consider, which is given in (25), is CONTIGUITY. This is a constraint that did crucial work in previous talks by Rosenthal, Shaw, and Urbanczyk. What this constraint says is that the strings standing in correspondence, in both input and output or reduplicant and base, are contiguous, with no skipping and no intrusion. So, for example, this constraint will ban medial epenthesis or medial deletion in the output/input domain. In the domain of the reduplicant/base relation, it bars skipping of elements in the copy and intrusion of non-copied elements into the reduplicant. (As noted, CONTIGUITY requirements in different directions (no skipping, no intrusion) may be distinct constraints.)

Another constraint, somewhat similar, but nonetheless distinct, is LINEARITY, in (30) at the top of page 7. This constraint says that the strings standing in correspondence must have the same precedence structure, in reduplicant/base and in input/output. This constraint will be violated in cases of metathesis or, in a slightly different way, in cases of coalescence or diphthongization. (These different LINEARITY effects – no reordering, no fusing, no splitting) might ultimately turn out to be distinct constraints too.)

The constraint we've called BASE-DEPENDENCE, which is in (24) at the top of page 6, is the analog in the reduplicant/base domain of the familiar constraint FILL in the output/input domain. BASE-DEPENDENCE was important in the talks presented Wednesday by Pat Shaw and Suzanne Urbanczyk.

In the more familiar output/input domain, this constraint is satisfied when there is no epenthesis – that is, when all of the elements of the output have correspondents in the input. Similarly, in the reduplicant/base domain, this constraint is satisfied when the reduplicant contains no elements that are absent from the base – that is, when every element of the reduplicant has a correspondent in the base.

The final constraint (and one that we'll be calling on shortly) is in (26), and it's called ANCHORING in the reduplicant/base domain or ALIGN in the domain of output and input. Constraints of these types were important in most of the talks you heard. So for example, constraints on ALIGNMENT played a role in talks by Inkelas, Rowicka, Féry, and Itô & Mester. And, as for ANCHORING, it was important in the talks on Wednesday by Downing, Urbanczyk, and Shaw.

The formalization that's given in (26) pertains to same edge-alignment only (deferring formalization of the different-edge alignment constraints like those required in Axininca Campaor Ulwa). It effectively says that all correspondents of any peripheral element are also peripheral. In other words, correspondents must share edgehood.

These, then, are the constraints on correspondent elements. I will now pass the torch to my colleague, Alan Prince, who will present further material on this subject.

I lift the liquid torch. Before we begin, I have just one word to say to the audience: *manaʔ-manara*. Why am I saying this word? You will know by the end of the talk. But more specifically, I ask you to correct a typo by inserting a glottal stop in (45a) to produce the word *manaʔ-manara*, whose derivation will entertain us for the next period of time. Got it?

OK. So we're now on page 7. I have two basic goals here. The first goal is to discuss certain phenomena in Makassarese which will exemplify, illustrate, and illuminate the application of the constraints that John has just been discussing. A particular constraint we are interested in is (35) on your handout – FINAL-C, the assertion that every prosodic word is consonant final.

(This constraint that figured in Rosenthal's presentation, for example, and can be traced back to work by McCarthy, McCarthy & Prince, Piggott and others.) What I'd like to do, in the first half of my presentation, is to discuss a rather striking parallel to the implementation of this constraint in the two different domains that John was discussing – namely, the input/output domain and the reduplicant/base domain. And we will see that this constraint leads an interesting life in the language Makassarese: the way that it works in this language is perfectly parallel between the two domains. Thus, this will provide us with an argument for the overall generalization that we've been urging, namely, this idea of massive formal correspondence between the constraints on reduplicative identity and the constraints on input/output identity. This is a key part of the program that we are trying to put forward here, in which constraints on these various domains are seen as falling under a much more general heading than the particular domains.

In the second part of the discussion, I'd like to advance slightly beyond this and pursue a question which arises here: the lack of featural identity between reduplicant and base. We will argue that lack of featural identity between reduplicant and base, when they stand in correspondence, is identical to the lack of featural identity that phonology often presents us with in input/output. We'll also see one final twist that arises through the reduplicative notion of correspondence, namely, the phenomenon of not lack of identity but of too much identity. This is somewhat in the sense of Ingmar Bergman's *Persona*, perhaps, in which we have a kind of over-exactness of identity forced by certain intimate relations.

Since we want to make a parallel between the phonological behavior of the language, aside from reduplication, let's begin by grappling with the frighteningly complex phonology of this language. So, in (31) some key facts are mentioned. First, each vowel heads a separate syllable – a fact that I hope you will not find too surprising. Secondly, the stress in the language is penultimate, though epenthetic material is ignored in this reckoning. From the observation that stress is penultimate, we can immediately deduce that feet are very likely to be disyllabic trochees, and therefore by the usual deduction the minimal word is going to be disyllabic. This prediction is attested in spades – there are no monosyllabic words in the entire language, as the original investigators made clear through thorough investigation. And the original investigative (Aronoff, Arsyad, Basri, & Broselow) team included native speakers.

Finally we make the observation which will key into our discussion of final consonants: the only legitimate word-final codas in the language are ʔ and ŋ . Clusters consist of a glottal stop followed by a consonant, a homorganic nasal consonant cluster, or geminates. There is no contrast between the sequence glottal stop+voiceless consonant and geminate, and we will simply represent all geminates as glottal stop+consonant clusters.

Now let's examine the epenthetic situation in the language, as in (32). The generalization is right there: roots ending in

consonants other than the licit codas just mentioned are parsed epenthetically. In other words, if you have a root like *rantas*, CODA-COND is going to forbid you from realizing that *s* as a coda. Then you have approximately two choices. One is to drop the *s* – the other is to epenthesize – and it's the latter alternative which is taken. You can see from the data on the handout in (32) the extremely general pattern by which these final consonants are handled – so from *rantas* we have *rantasaʔ* and from *jamal* we have *jamalaʔ*. And you will have noticed a peculiarity both on the paper and in my pronunciation of these words – which is undoubtedly extremely authentic (it comes from reading the works of Joseph Conrad). And this raises the following question in your minds, I hope. Namely, why the epenthetic glottal stop so emphatically produced only moments ago, in addition to the epenthetic vowel? If we're really going to save a consonant from annihilation is it not sufficient to epenthesize the vowel? And does not the doctrine of correspondence tell us that violation via epenthesis should be utterly minimalized? So, if we are going to minimize FILL violation, why are we going around sticking a consonant on? The answer, of course, is because of the constraint just mentioned, FINAL-C.

How are these things going to be arranged? Let's examine the relationship between the constraints we just alluded to. First of all we have, as in (34), that CODA-COND must dominate what we can call FILL-V. This is the constraint that says you should never insert a vowel – which is opaquely now known as FILL-V. CODA-COND dominates this because it forces violation – that is to say, vowel epenthesis.

What about FINAL-C, the idea that prosodic words should end in consonants? Well, we see in (36) that we have the relationship of FINAL-C dominating FILL, because that final consonant pops up in response to pressure, we argue, of FINAL-C. So, like many languages, Makassarese wants its words to be closed off definitively with a consonant, and this is achieved completely in these epenthetic cases

Now comes an interesting little twist here. If we look further in the language, we observe, as under (33), that roots and stems and words which themselves end in an actual vowel lexically never receive this glottal stop, so /lompo/ is just *lompo* and not **lompoʔ*. This seems to be a blatant contradiction to the imperative to close off words. How could this happen? Well, the answer, as you will undoubtedly expect, is due to the force of the familiar alignment constraint given in (37). Namely, that the root (or perhaps some larger category such as stem) is Right-Aligned with the prosodic word. This is paraphrased in (37). So we can say that the root or stem or whatever it is ends exactly at a prosodic word edge.

In (38) you see how the dominance of this constraint affects the outcome. So when we have an authentic underlying final vowel, we do not destroy its alignment by asserting the primacy of FINAL-C, as in (38b). Rather, we preserve its alignment. This gives us the domination of ALIGN-RIGHT, which we see in the tableau there.

One final interaction needs to be plucked from this mass and that's shown in (39): CODA-COND obviously dominates ALIGN-RIGHT. If you were desperate to align all words, you would form even a bad syllable at the end of the stem or root to make sure its lexical content was well aligned. This does not happen in Makassarese.

Putting all these things together we arrive at the ranking summary in (40). Now rankings of four constraints can achieve a level of opacity which seems forbidding. In this particular case, I think, if we just simply pass our eyes from left to right on them we can really understand what the intuitive content of this hierarchy is.

So start at the highest-ranking constraint, CODA-COND. To paraphrase the ranking, CODA-COND is met – it is the highest ranked constraint – because there is always a candidate that meets it due to the possibilities of epenthesis. So CODA-COND is simply met because it can be met.

What about ALIGN-RIGHT? Well, ALIGN-RIGHT is met if you can meet it without violating CODA-COND, the constraint ranked above it.

What about FINAL-C? Now this is kind of interesting. When is FINAL-C met? FINAL-C is met obviously when it accords perfectly with alignment – when alignment is satisfied, as in a word like *bulaŋ* which itself ends in a consonant. Everything is dandy. But if we look a little further we see the typical alignment style of argument – FINAL-C is met not only when ALIGN-RIGHT is met but also when ALIGN-RIGHT is violated by every surviving candidate at that point. That is to say, when ALIGN-RIGHT is irrelevant.

So under what conditions can ALIGN-RIGHT be irrelevant? Well, let's go back to tableau (36) and look at those two candidates. Because of the supremacy of CODA-COND, a stem like *rantas* must have epenthesis, right? This de-aligns it. Every viable candidate is therefore de-aligned. ALIGN-RIGHT has nothing to say about this. There is nothing then to hold that epenthetic vowel down as the last element in the stem – because it is not in the stem. It has no morphological affiliation, so the word is not aligned. Alignment is impossible and as a consequence FINAL-C makes its force felt right here. This is a canonical example of Emergence of the Unmarked. When the dominant constraints are irrelevant for one reason or the other, something which is a dominated and half-hidden constraint sneaks out and makes its force felt in that domain of the grammar. This is exactly what we see here. And to conclude the ranking, the low level of FILL tells us that satisfaction of FINAL-C or CODA-COND is going to be accomplished by epenthesis.

Therefore, we now understand how it could be that only certain stems in the language obey the universal constraint FINAL-C – they obey it just when they can't be aligned.

Let us now examine the Makassarese reduplicative forms. What we notice is that the fundamental pattern is shockingly simple and typical of the whole area; cast your eye over the whole thing

first and you'll notice that the reduplicant is always exactly two syllables – no more and no less.

In (42a) we have exact reduplication. What becomes interesting is the material in (42b) and (42c). Here we see that there is a variety of cases in which a glottal stop suddenly pops up at the end of the reduplicant. Now the first thing you might think is this, examining the case here of *manaʔ-manara* (as promised we've arrived at this important word): "geewhiz, that glottal stop is some kind of reduced version of r". Well, nothing could be more incorrect, more delusional. And this is shown by the very next example, *balao*. In *balaʔ-balao*, there's nothing to which that glottal corresponds in any sensible way, since there are no unreduplicated consonants left in the base.

The actual generalization emerges when we look at these forms. When do we get the glottal stop? We get the glottal stop *just in case the disyllabic reduplicant is not an exact copy of the stem*. So we look at (42a), with the simple reduplicants, many of which do not end in glottal stops – you see that, in fact, their virtue is that they are complete, exact and total copies of the base.

But in (42b) we're in a tough situation because we cannot have an exact copy of the base within a disyllabic reduplicant. And in exactly this case, the glottal stop pops up.

(42c) illustrates this with disyllabic reduplicants of roots where epenthesis has taken place, very exactly parallel to other polysyllabic roots, and (42d) mentions in the finest of type a further case where the glottal stop shows up which we will not be talking about today, though I invite you to scrutinize at your leisure if you have obtained a copy of the paper John mentioned earlier.

So let us plunge on then to an analysis of this phenomenon. The basic account is extremely simple, as befits a good theory. It is given in (43). It is perfectly clear that we need to declare the status of the reduplicant as a stem – the reduplicant is a stem. OK, that's a lexical/morphological declaration. With that declared exactly as in all the cases discussed in our talk on Wednesday, we can deduce as desired that the reduplicant must be exactly disyllabic, given the prosody of the language and the dominance of the Prosodic Word Restrictors over MAX. So violation of MAX will eliminate enough stuff so that we have the perfect bisyllabic reduplicant which is the ideal prosodic word of any language which is the ideal stem of any language.

Now let's turn to the specific issue of C-finality of the reduplicant. This is the parallel that we are hunting for, obviously. Only moments ago we found out that C-finality plays a kind of covert life in the language as a whole, sneaking out when other constraints have not suppressed its activity. And here we have a rather parallel situation, in which exactly the same theme emerges: glottal stop peeks out under a certain subset of cases of reduplication.

So let's examine them. Well, how are we going to explain this intrusive ʔ and how are we going to explain the parallel? We are going to depend on correspondence, as mentioned in (44) in the handout, which is essential to determining or expositing the equivalence of the constraints on the reduplicant/base and the output/input relation.

So from (45) (now, I hope, repaired by everyone) we see that, just as we determined that FINAL-C dominates FILL, so exactly here we find that FINAL-C dominates the reduplication-relevant version of that constraint, namely, BASE-DEPENDENCE.

So we see in (45a) manaʔ-manara, where the glottal stop is not in correspondence with anything. We have a non-correspondent glottal stop popping up at the end of the reduplicant – why is it popping up there? It is popping up there to satisfy the requirement FINAL-C at the expense of the requirement of BASE-DEPENDENCE, which it violates because it has no source in the base.

Let's now turn to an interesting twist on the basic generalization. As you recall from our discussion of example (42) on page 8 of the handout, we get exact reduplication when the stem is bisyllabic, and this exact reduplication will preclude the presence of a final epenthetic-like glottal stop. So if you look at (42a) on the handout, you'll see forms like *batu-batu* instead of *batuʔ-batu* – forms like *golla-golla*, not *gollaʔ-golla* etc. OK?

A kind of parallel can, I hope, be discerned at this point in the argument: when the relation between the base and the reduplicant can be exact, it is, just like the relationship between the input and the output. If you have a final vowel in the underlying form you preserve its finality. And a similar thing is seen here: if you have a final vowel in the base, you preserve its finality in the reduplicant. Inserting a glottal stop would destroy that desirable finality of the stem-final vowel.

The question then would be, how can we obtain this result? Well, in (46) we have a proposal. Just as before we argued that finality was preserved in the correspondence relationship between underlying form and surface form, so we want to argue that it is preserved in the relationship between base and reduplicant by exactly the same constraint, to wit ALIGN-RIGHT.

So if ALIGN-RIGHT dominates FINAL-C, something that we need in the language as a whole, let's see what happens. We will use the definition of ALIGN that John discussed in his part of the talk. So if I recall correctly, John said something like this: all correspondents of a peripheral element are themselves peripheral. And this is formalized under the square bullet in (26). The actual text under (26) in quotes is, of course, incorrect, but the sequence of upside-down A's and backwards E's captures it exactly. You can work that out at your leisure, if you so desire. But the important thing to remember is the idea behind this: all correspondents of a peripheral element are also peripheral.

What are we doing here with the notion of correspondence? Well, we are generalizing the properties of an individual element to the set of its correspondents out there in the phonological world. These correspondents may be input/output correspondents (that is, surface forms corresponding to underlying forms) or they may be reduplicant/base correspondents.

You will deduce from what I said that we are assuming that correspondence relationships are basically transitive. If A is a correspondent of B and B a correspondent of C, then A is also a correspondent of C. What we are saying here is that alignment is a property which not only applies to a specific kind of element *but also to all its correspondents wherever they may lie.*

Under this interpretation we get the result as shown in (46). If you would scrutinize the correspondence relationships carefully detailed there – the underlying/surface correspondents are indicated by the subscript 1 and the reduplicant/base correspondents by the subscript 2 (where they are crucial, namely for the final segment) – you should see this quite interesting little twist: there is a constraint which says that the final element of the underlying form should be aligned and, indeed, *every correspondent of that element* should be aligned with the prosodic word edge.

Let's examine form (46a) *lompo-lompo+i*. How come we don't have a glottal stop there? Well, notice that by omitting the glottal stop we achieve wonderful right word-edge alignment of the *o*. Now it so happens that we only achieve that in the reduplicant, because the *o* of the base *lompo+i* is somewhat distant from the prosodic word boundary. Nevertheless, it is a good thing to achieve whatever we can achieve. And therefore, form (a) is going to be optimal.

In form (b) we follow the pattern (which I'm sure one would fall into naturally if one were going to speak Makassarese as a second language) of overgeneralizing by inserting the glottal stop. So we say, incorrectly mind you, **lompoʔ-lompoi*. Why is that incorrect? It is incorrect because it de-aligns the reduplicant. There is a correspondent of an element that is final that is here rendered nonfinal. You can see that exactly in the tableau that's given in (46).

To complete the argument and make it exactly perfect – perfect in the sense that we've added absolutely nothing to the phonological analysis – if we could identify the constraint BASE-DEPENDENCE with the constraint FILL, then, once we have learned the general phonology of the language, we get *manaʔ-manara* as a consequence. So we conjecture that is the right thing to do and note the absence of any evidence that these two constraints are actually distinct (unlike MAX and PARSE).

Now there is one final issue that I'd like to look at. We've discussed now a matter of base/reduplicant disparity caused by an alignment constraint and another structural constraint on consonant finality of stems. I'd like to point out that there's a

kind of interesting other case of featural disparity in the language which is not quite as dramatic, and thereby hangs its interest.

So, if you consult page 8 on the handout and go back to (42a) and look at the bottom word there *bulaŋ*, you will observe that reduplication there is also inexact. So we say *bulam-bulaŋ*, we do not copy the nasal exactly. And if we look down at the bottom of (42b) there, we see that in a rather parallel case, we have /baramban/ as the underlying form. We do not say, as tantalizing as it is, *baram-baramban* – instead, we say *baraʔ-baramban*. So that provides us with a case of extreme disparity, as it were. If we think that in each case we're trying to copy a consonant, then we've reached a serious conundrum. Because in the former case (42a), *bulam-bulaŋ*, we indeed copy as much of the consonant as we can get away with under the phonology of the language. Whereas in the case (42b) we forget as much as we can forget about the consonant, finding ʔ instead.

So what I'd like to do now is explore exactly these variations of disparity and enter a proposal for how this can be understood. The first and key assumption we will make is that the dividing line between these two things is exactly the dividing line between correspondent and non-correspondent. So in all the discussion up to this point, I've argued that the glottal stop is not a correspondent of the base.

In the tableau (48a), this is clearly drawn out for the form *baraʔ-baramban*. As you can see, by placing your nose against the page perhaps, the glottal stop there is not a correspondent of anything in the base. It is supplied by Gen and selected by the process of constraint satisfaction that we just discussed. So in order to solve this problem, we're going to have to say that the milder version of disparity in the case of *bulam-bulaŋ* is due to some other process. In fact, we will say that *is* a case of correspondence. So what we want to do here is draw a distinction between correspondents which suffer defects of identity and elements which are themselves completely noncorrespondent.

So what conclusion do we draw from this? See (52) on the handout: correspondents need not be perfectly identical. Hence *m* and *ŋ* stand in correspondence in *bulam-bulaŋ* in Makassarese. Similar cases can be found in many languages, among them Tübatulabal. But, in a case like this, where we have things which are transparently and necessarily correspondents between the base and the reduplicant, the differences are not arbitrary. Rather they must follow from other constraints in the grammar – that is, general phonological considerations – which are higher ranking than the constraints on reduplicative identity. So in a case where we have a correspondent, that correspondent will still be liable to the effect of high ranking constraints in the language which, in the best case, will be extremely general constraints (not ones of limited domain) and will therefore simply represent the phonology of the language.

On the other hand, when something is not correspondent, then it basically will have the same status as an epenthetic element, and it will fall down upon the usual nest of constraints on featural markedness which determine the form of epenthetic segments.

How can we implement this idea that there is an important distinction between correspondent and non-correspondent elements? The correspondent elements need not be in perfect identity, yet their failure of identity must be compelled, motivated. The idea we want to explore is to use the notion of correspondence, relying on the same thematic idea that I mentioned in the theory of alignment: an element shares properties with all of its correspondents. So, for a variety of constraints, elements in correspondence form an equivalence class and properties can be inherited from one correspondent to the other. This notion is given in (53) on the handout, to tie together the realization of correspondents to one another. We will do this under the assumption that features are attributes of segments, not objects in themselves.

Fundamental to this enterprise is the constraint given in (54), PARSE-FEATURE, said of some feature ϕ . For any segment s and feature ϕ , if s is a ϕ then any correspondent of s is a ϕ . That is to say, the featural attributes of any element ought to be shared by all of its correspondent element.

Some consequences of this constraint are given at the bottom of page 10. First, unless PARSE-FEATURE is crucially dominated, segments that stand in correspondence must be identical, since all of their featural attributes must be identical. Second, if this constraint is crucially dominated in some segment, then that segment and one or more of its correspondents in the reduplicant and in the base or in the output and the input will differ in the value of the feature ϕ .

Through this notion of correspondence, PARSE-FEATURE will have the same effect on reduplicant/base correspondent elements as it does on output/input correspondent elements.

An application of the constraint PARSE-FEATURE is shown with Makassarese data in the tableaux (55) and (56) on the handout. The first of these in (55) depicts the situation of Makassarese and of many other languages that is typical of nasal place assimilation. A nasal standing before a stop in Makassarese must have the place of articulation of that stop.

Let's assume that there is a constraint or some hierarchy of constraints that is responsible for this pattern of assimilation, and we'll simply dub that constraint or hierarchy "NC Assimilation", as shown in the tableau. Now this constraint must crucially dominate PARSE-FEATURE of the place features for the constraint "NC Assimilation" to be visibly active. This is shown by the tableau (55) and the comparison between candidate A with proper assimilation and candidate B with a non-homorganic nasal consonant cluster. B violates "NC Assimilation" but faithfully parses the place feature [labial] of the m .

In contrast, (55a) is an unfaithful parse, assuming the input /bambu/, as shown there. The *n* of (55a) *bantu* stands in correspondence with an input /m/. Since the input /m/ bears the feature [labial] and the output *n* bears the feature [coronal], the constraint PARSE-FEATURE of the place features is violated. Two elements standing in correspondence differ with respect to this featural attribute. The violation of PARSE-FEATURE is, of course, entirely expected and licit here since it is compelled by the higher ranking constraint that is responsible for nasal cluster assimilation.

Now the crucial point can be seen in tableau (56). This shows that exactly the same constraint can be responsible for a failure of reduplicant/base identity. Here we have the form derived from reduplication of *bulaŋ*, which is *bulam-bulaŋ* in (56a). In that form the *m* of the reduplicant stands in correspondence with an *ŋ* in the base. This is a failure of identity between the reduplicant and the base, but not a failure of correspondence. The two elements stand in correspondence but have different featural attributes. So the constraint PARSE-FEATURE must be violated.

In this case of reduplicative correspondence, then, the PARSE-FEATURE constraint is violated under compulsion of "NC Assimilation" just as it is in the output/input correspondence shown in (55). The overall point is that the relation of correspondence need not preserve identity, as long as a high-ranking constraint compels failure of identity. Yet that constraint will be active in two different domains simultaneously, both in the relation between the output and the input, as in tableau (55), and in the relation between the reduplicant and the base, as in tableau (56). This captures the result promised in (52): differences between reduplicative correspondents are not arbitrary; instead, they follow from *high-ranking* (therefore general) phonological constraints of the language.

This conception of correspondence and its relation to identity leads to a couple of other sets of results, only one of which we will have time to discuss here, though the other is provided for you in the handout. If you'll consult (57) you'll see a typical example of what has come to be known as reduplicative paradox, a case where a phonological process appears to overapply or, in some cases, underapply in reduplicated forms. The example here, which is drawn from Pulleyblank's work on Yoruba, involves a general phonological process by which *n* becomes *l* before a non-high vowel. As shown in the example *ni owo* becomes *lowo*, there fed by deletion of the first of two vowels in hiatus. This process overapplies in reduplication, as is shown by the example *lilowo*, not **nilowo* as would be expected if the application of this process were normal. (It should be noted that Pulleyblank does not analyze this phenomenon in overapplicational terms, but rather via spreading.)

Let's assume appropriate phonological constraints. One of them militates against *n* followed by a non-high vowel and the

other is a version of PARSE-FEATURE, specifically of the feature [nasal]. These constraints conflict in an expected way, since one of them prohibits nasals under certain conditions and the other demands faithful parsing of the feature nasal. The ranking, obviously, puts *N[-high] at the top of the hierarchy, since it would otherwise not be visibly active.

The tableau in (57) shows how the overapplicational effect in Yoruba is obtained – see the interpretation in (58). First of all, form (c) can be dismissed immediately, since it violates the constraint that drives the alternation, namely, the higher ranking constraint against the nasal followed by a non-high vowel. This leads us to consider the overapplying candidate (a) and the normally applying candidate (b).

Candidate (57b) violates PARSE-FEATURE twice, once in the relation between the output and the input and once in the relation between the reduplicant and the base. To see that, consider the relations of correspondence in which the *n* and the *l* stand. The *n* of the reduplicant in (57b) stands in correspondence with an *l* of the base. That *l* of the base however, stands in correspondence with an /*n*/ of the underlying form. So what we have is unfaithfulness, that is, a PARSE-FEATURE violation or a clash of featural attributes in both the output/input domain and the reduplicant base domain.

In contrast, the form in (57a) has only a single featural clash, one in the output/input domain. That's violation of PARSE-FEATURE engendered by correspondence between the *l* of the output base and the input /*n*/. We therefore have so-called overapplication as a kind of faithfulness effect: elements standing in correspondence ought to be as similar to one another as possible. Maximal similarity – which is nothing more or less than minimal violation of PARSE-FEATURE – is achieved through positing *l* in the reduplicant even though it precedes a high vowel.

This is a general theory of reduplicative overapplication. (Chapter 5 of our manuscript *Prosodic Morphology I* contains another example of how this theory works.) It also provides the tools for a theory of underapplication, and for cases like Tagalog, recalled at the end of (58), in which the base "copies" the reduplicant, in a kind of reversal of the Yoruba situation.

This brings us at last to the conclusion. A summary is provided in section 7 at the bottom of page 12. The principles of reduplicative exactness show precise formal parallels, we've argued, to the principles of faithfulness to lexical input. And these are both encompassed within a single theory of correspondence and constraints on correspondence.

Failures of featural identity in reduplication which come in two types. One of these types involves elements that are non-identical but correspondent, such as the example of Makassarese nasal assimilation. In this case, disparity between the two correspondent elements is compelled by high-ranking constraints

that are visibly active in the language as a whole. It is a phonologically motivated disparity.

There are also cases of elements which are non-identical and also non-correspondent. These are intrusive or epenthetic elements of various kinds. And their character is determined not by conditions of identity, since they are not standing in correspondence, but rather by Emergence of the Unmarked, the effect of universal but half-hidden constraints. These elements have the same basic properties, and are governed by exactly parallel constraints, in the domains of reduplicant/base and output/input.

A final aspect of reduplicative identity that's important is seen in the examples like Yoruba – where reduplicant/base correspondence can force excess of identity, in the face of otherwise active constraints.

In every case, Prosodic Morphology, we have argued, is directly built from independent general principles of prosody and morphology. And so we end by returning to our main theme.