

Maximal Words and the Māori Passive*

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1. Introduction

Thank you all for coming. My first aim in this talk is not to convince you of anything tortuously theoretical, but instead allay your fears. If you're anything like me, the last thing you want to see after 8½ hours of talks and courageous mental effort is a handout that looks to be about the same length as a short novel. It would be fine if the handout was half full of data, but – I'm sorry – it's not: it's a mishmash of theoretical points and one of the most perplexing cases of allomorphy known to humankind.

All these things might have made you try to calculate how quickly you can get out the nearest exist and get something to eat before you collapse from hunger. However, before you try to make a dash for the door, let me assure you: the theoretical point I aim to make here is fairly straightforward, even simple.

This talk is about a type of phonological condition which I call a '**maximal word restriction**'. Maximal word restrictions are limits on how big words can be. I'm sure the majority of you have heard about *minimal word restrictions*, defined in (1).

Minimal word restrictions require the output size of words in many languages – probably the majority – to be at least bimoraic. So, in this talk I'm going to argue that similar restrictions can be seen in terms of maximality: some languages only allow words that are under a certain size limit.

Now there's something that I must emphasize straight away. When I talk about 'words' here I really mean *prosodic word*. A 'prosodic word' is a prosodic constituent that *tends* to match up with word or stem boundaries. But they don't have to.

By the way, to make it clear when I'm talking about prosodic words in the handout, I've used a lower-case omega.

What is of interest to us is when PrWds do closely match with morphological words *and* a minimal or maximal word restriction is in place. A language where we can both sorts of restriction is in Maori, a Polynesian language spoken in New Zealand. In Maori, there is a minimal word restriction: prosodic words cannot be smaller than two moras. On top of that, there is an independent requirement: every root has to appear inside its own PrWd. Now, since every root is contained inside its own PrWd, and every PrWd is bimoraic, then every root shows up as being bimoraic on the surface.

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What's of more interest to us is the maximal word restriction in Maori. It turns out that (generally speaking) *PrWds* are never four or more moras in size. Again, since all elements of a root have to be contained inside the same *PrWd*, that means that roots will never show up with four or more moras.

So, roots in Maori are either bimoraic or trimoraic: a result we owe to both a minimal and maximal word restriction.

Now, it turns out that although there is a vast literature on minimal word restrictions, very little has ever been written on maximal words. In fact, I don't know of any work that focusses on them. So, part of this talk has an empirical aim: I want to show that maximal word restrictions exist.

The theoretical aim of this talk is primarily reductionist: I am going to argue that we really don't need to say much about maximal- ω restrictions at all – they reduce to constraints and principles that are already present in current theory.

And that brings me to my main example: Maori.

At this point you might be wondering whether the generalization I made about Maori above is really a maximal word restriction or whether it's a diachronic accident. Perhaps Maori developed from an ancestor language where people liked to be economical with their speech.

Well, the only thing that would settle the issue is alternations. In other words, if we find that some morphological process – like affixation – *should* produce a larger than maximal- ω s but *doesn't*, then we have evidence that maximal word restrictions are in effect.

Thankfully, Maori has just such a process in the concatenation of the passive suffix. Some of the forms of the passive are given in (6) to whet your appetite – and potentially confuse you.

A lot of you may have heard about the Maori passive suffix. Over 15 papers have been written about this affix, and it was discussed at length in Kenstowicz & Kisseberth's *Generative Phonology* textbook.

Of some interest is that the first major discussion of its importance was by Ken Hale, from MIT (of course). That was followed by John McCarthy's influential phonological analysis in 1981 – also written at MIT. Now that I'm giving a talk *at MIT*, I feel geographically justified in presenting a somewhat different analysis of the passive.

But, we'll get to the passive soon enough.

The first thing I'm going to do is talk about how maximal word restrictions come about in Optimality Theory.

[7 minutes]

(1) **Minimal Word restrictions:** a limit on the smallest possible size of a Prosodic Word (ω). [Broselow 1982, Prince 1983, McCarthy & Prince 1986 and many others].

(2) **Maximal Word restriction:** a limit on the largest possible size of ω .

(3) Limitations on ω 's may have consequences for the size of morphological words or roots.

☞ *But* this depends on how the language chooses to align the edges of ω 's with morphological words/roots.

(4) **Example:** M^{ori} (Polynesian)

(i) Min- ω Restriction:

- No ω has fewer than two moras.
- Every Root is contained inside a unique ω .
- Therefore every Root is bimoraic on the surface. (i.e. *[pa])

(ii) Max- ω Restriction (simplified a little):

- No ω is four (or more) moras in size.
- All elements of a Root must be contained inside the same ω .
- Therefore, no Root is four moras in size. (i.e. *[patakata]).

(5) **Aims of this talk**

- *Empirical:* Show that Maximal Word restrictions really do exist.
- *Theoretical:* Show that they can – and must – be accounted for within Optimality Theory.

(6) The centre-piece of this talk is the allomorphy found in the M^{ori} passive suffix:

<i>Root</i>	<i>Passive Form</i>	<i>Gloss</i>
horo	horo- a	fall in fragments
hoka	hoka- ia	run out
mahue	mahue- tia	put off
kopou	kopou- a	appoint
(inu	inu- mia	drink)

(7) **Outline**

§2: The Theory of MaxWd effects.

§3: Empirical evidence for MaxWd effects.

§4: Violability, Ranking, and MaxWds: M^{ori} Allomorphy.

§5: Alternatives, and Serialism.

§6: Typology & CON: MaxWd effects that do and don't exist, and why.

§7: Conclusions.

2. The Theory of Max- ω Effects

The way I'm going to deal with Maximal word restrictions is analagous to the way McCarthy & Prince (1986) dealt with *minimal word* restrictions.

M&P argue that min-wd effects reduce to general constraints on prosodic structure. Importantly, there is no single 'minimal word' constraint. Instead, it's derived from the interaction of general principles, as outlined in (8).

They argue that min-wd conditions reduce to foot form considerations. Specifically, since feet must be minimally bimoraic, and every PrWd must contain at least one foot (by Strict Layeredness), PrWds must be minimally bimoraic.

- (8) McCarthy & Prince (1986 et seq.) argue that minimal ω effects reduce to general constraints on prosodic structure.
- There is no single minimal ω constraint.
 - Instead, since:
 - Feet are minimally bimoraic
 - Every ω must contain a foot
- Then every ω is minimally bimoraic.
-

I'm going to argue that something similar can be said about maximal word restrictions too. In other words, maximal word restrictions come about when prosodic constraints that minimize structure outrank constraints that tend to preserve structure – or as we'll see later on – try to keep all root elements in the same PrWd.

- (9) I will argue the same for Max- ω effects here.
- Max- ω effects come about when prosodic constraints that minimize structure outrank faithfulness constraints or constraints on ω -formation.
-

The difference between maximal and minimal word restrictions, though, is that there are many more relevant constraints for maximal word restrictions and a lot of them conflict. Because of this, languages are not cross-linguistically uniform in their maximal word restrictions. Some of them may restrict PrWds to two moras in size, while others have a three-mora maximum. Others might not have any maximum at all.

To give you a very brief example, let's look at Yorta Yorta. Yorta Yorta has a particularly severe restriction: PrWds can only be bimoraic and no larger. We can get this restriction by invoking two well-established constraints: ALL-FT-L and ALL-FT-R, defined for you in (10). The former constraint requires every foot to appear at the left edge of a PrWd while the latter requires every foot to appear at the right edge. Like most languages – and perhaps universally – feet are maximally bimoraic. Of course, the only way for every foot to be both leftmost and rightmost is for there to be one single foot that is coextensive with the PrWd. In tableau (11) we see what happens when both of these constraints outrank MAX, which militates against deletion.

In this tableau, it's better to delete elements rather than have more than two moras. As you can see in candidates (b) and (c), there is no way to be faithful without also violating the foot-alignment constraints.

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- (10) A brief example: A bimoraic maximum ω :
- ALL-Ft-L “Every foot must appear at the left edge of a ω .” (M&P 1993)
 - ALL-Ft-R “Every foot must appear at the right edge of a ω .”
 - MAX-IO “Don’t delete.” (M&P 1995)

- (11) Max- $\omega = 2\mu$.

/pataka/	ALL-Ft-L	ALL-Ft-R	MAX-IO
a) (páta)			x x
b) (páta)ka		x!	
c) pa(táka)	x!		

Now for another brief example. It turns out that lots of languages – lots of Austronesian lgs, at least – seem to have an active trimoraic maximum on PrWds: you can have Prwds of either 2 or 3 moras, but no more.

To get this fact, we need another constraint, defined in (12). This constraint will prove to be extremely useful to us later on. It is violated when a candidate has two adjacent *unfooted* syllables. Note that adjacent *unstressed* syllables are fine, as long as one of them is footed. This formulation will prove crucial later on.

For present purposes, though, the constraint can be used to deal with trimoraic maximums. In tableau (13), for example, an unerlingly trimoraic form surfaces faithfully – it doesn’t undergo deletion because there is no need for it to do so. The winning form (a) does have all feet at the left edge, and there are no sequences of unfooted syllables.

- (12) More common are 3- μ Max- ω restrictions (e.g. ???)
- LAPSE-Ft “Incur a violation for two adjacent unfooted moras.”
i.e. *[(pata)kata], but ✓[(pata)ka], ✓[pa(taka)ta]
[See Green & Kenstowicz 1995, cf Selkirk 1984]

- (13) 3- μ ω 's are fine...

/pataka/	LAPSE-Ft	ALL-Ft-L	MAX-IO
(a) (páta)ka			
(b) (páta)			x x!

In comparison, the four mora form in (14) must undergo deletion. No matter how the faithful forms are prosodified, they will violate one or other of the prosodic constraints. For example, candidate (a) is a partially footed form, and fails Lapse-Ft because it has two unfooted syllables. In comparison, (b) is a fully footed form, but in having two feet it necessarily violates All-Ft-L because the second foot isn’t leftmost.

The winning option is to reduce the form to three moras.

(14) 4- μ ω 's are not...

/patakata/	LAPSE-Ft	ALL-Ft-L	MAX-IO
(a) (páta)kata	x!		
(b) (páta)(kàta)		x!	
𐀓 (c) (páta)ka			x

In short, I'm suggesting that maximal word restrictions come about when prosodic constraints outrank constraints on preservation. In the case study we're going to look at in a second, I'm going to emphasize that maximal word constraints must indeed be reduced to several interacting constraints, and on top of that those constraints are necessarily violable and ranked wrt each other. In other words, I'm going to blantly advocate Optimality Theory – go team! That is the aim of the next two sections – which focus on Maori.

As you've seen, the prosodic constraints I'm talking about are common ones – there are really no great surprises there. But simply identifying a few constraints that are useful in analyzing minimal word restrictions is by no means enough. As a responsible advocate of OT I must talk about types of constraints that *must not* exist in CON. In other words, for the theory to even begin to be complete, I have to make sure that no constraints and no rankings of those constraints ever produce unattested sorts of maximal word effects. I'll talk about this after Maori.

[at 14 minutes!]

(15) **Theoretical Aims for the rest of this talk:**

1. Show that Max- ω effects can be reduced to several interacting prosodic constraints.
2. Show that these constraints are necessarily ranked wrt each other.
3. Show that these constraints are violable.
4. Show which constraints *must not* exist in CON.

3. Max- ω Effects in Māori

Now that I've talked a bit about what a maximal word restriction is and how to get it, we arrive at the center-piece of this talk: Maori. As I mentioned in the introduction, maximal word restrictions have two visible effects in Maori phonology: in restricting root size, and in influencing the form of the passive morpheme. (It's said [má:ori], by the way – I'm pronouncing it in my English dialect here).

Maori is going to be the centre-piece here *not* just because I happen to have been working on it for a few years. That's entirely a coincidence. The reason I'm using Maori because it presents a good example of *alternations* which show the influence of the maximal word restriction.

As I mentioned earlier, at this point it would be reasonable to have a nagging feeling that so-called 'maximal word' restrictions are really just diachronic accidents. What we really need to clinch the deal are synchronic phonological effects on morphemes – preferably visible morphemes too. And that's what Maori has for us.

In any case, before launching into an exposé of the Maori passive, I would like to mention some relevant facts about Maori phonology.

(16) There are two areas where we can see the effect of MAX- ω effects in Māori:

- Root size restrictions
- Allomorphy

(17) *Background:*

- Māori is a Polynesian language spoken in New Zealand.
- It is spoken natively by 30,000-50,000 people (in 1995 – Maori Lg Commission).
- The data presented below is from:
 - Dictionaries: *Williams* (7th ed), and *Ngata*.
 - My own fieldwork (Northland dialects).

Maori has 10 consonants and five vowels. All of the vowels shown have long-vowel counterparts.

(18) *Phonemes*

<i>Consonants</i>			<i>Vowels</i>	
p	t	k	i	u
m	n	ŋ	e	o
f/ɸ		h	a	
w	r			

A schematic of the syllable is given to you in (19). Worthy of note are three things:

1. Onsets are optional
 2. Codas are banned entirely.
 3. Nuclei can be bimoraic. They can either contain a long vowel, or a diphthong.
- A diphthong is a vowel sequence that falls in sonority. In some dialects, vowel sequences of equal sonority (e.g. [eo], [ui]) also count as diphthongs. Importantly, if two adjacent vowels rise in sonority, they form separate syllables. So, while [ai] is a diphthong, [io] is not, as you can see in the syllable divisions in the examples.

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- (19) *Syllables*
 (C)V₁(V₂) where V₁=V₂ (i.e. a long vowel)
 or V₁ is more or as equally sonorous as V₂.
 (i.e. [ai au ae ao eo ei eu oi ou oe ui iu])¹
- | | | |
|------|------------|----------------|
| e.g. | [ta.ŋa.ta] | ‘man, person’ |
| | [ku.ri:] | ‘dog’ |
| | [a:.i.o] | ‘calm’ |
| | [tai.o] | ‘lock of hair’ |

- (20) *Stress*
- (1) On a bimoraic syllable,
 [ku.ri:] ‘dog’, [hí.ra] ‘seal’, [matáu] ‘hook’, [táima] ‘time’
 - (2) Else on the leftmost syllable
 [máte] ‘dead, kill’, [tánata] ‘man’

For our purposes, we can say that stress falls on a bimoraic syllable otherwise on the leftmost syllable. We don’t need to say anything more since almost no PrWds ever *can* contain more than one bimoraic syllable, for reasons we’ll talk about in a second.

Of some interest to us, also, is how PrWds are formed. Every root has its own PrWd, so compounds form separate PrWds. We can tell that they are indeed in separate PrWds because of stress and syllabification.

In fact, it’s almost true that every *morpheme* in Maori forms its own PrWd. The bimoraic affixes (of which there aren’t many) form PrWds on their own.

In my opinion there’s only one productive monomoraic prefix: and that’s a reduplicant. It attaches inside the PrWd of its host. We’ll have more to say about that later.

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- (21) *ω Formation*
- Every root has its own ω.
 {páti}{íti} ‘snow grass’, *{patí:ti}
 {púta}{ána} ‘sentry post’, *{putá:ŋa}
 - Every bimoraic prefix has its own PrWd.
 [{fáka}{íhi}], *[{fakáihi}] ‘effect by means of a spell’
 [{óho}{óho}], *[{ohó:ho}] ‘very valuable’

¹ The status of level-sonority diphthongs varies from dialect to dialect.

- There is only one mono-moraic prefix: a σ -sized reduplicant. It incorporates with the root's PrWd:
 [{{t̥i}tiro}] 'look', *[t̥i{tiro}] (from *tiro*).

[21 MINUTES]

Now that we have the preliminaries out of the way, let's talk about PrWd size restrictions in Maori. The attested roots in Maori can be defined as having one of four shapes. One sort is bimoraic – with either two monomoraic syllables or one trimoraic one. Another is trimoraic, with three monomoraic syllables, or one bimoraic syllable and one monomoraic syllable. Unlike what I said a little earlier, though, Maori does allow 4- μ PrWds. One type consists of a bimoraic syllable flanked by two monomoraic syllables. The other consists of a syllable with a long vowel followed by two light syllables.

We're going to focus on the first four types here because they're the most relevant for the passive. At this point you might be wondering what sort of PrWds Maori can't have. Well, it can't have a PrWd with four light syllables, or one that contains two heavy syllables.

In fact, as far as the first three root types go, we can make a couple of generalizations about what a Maori root may and may not have. Those generalizations aren't made that well in (24), so please disregard it. What I really want to say is that:

- (1) you cannot have more than one foot per PrWd.
 But (2) you cannot have an unfooted footable sequence.

These conditions can be antagonistic. In other words, whenever you'll get a PrWd with a footable sequence, it must end up footed, otherwise you'll violate one of the conditions I just mentioned.

Before giving an example to illustrate what I just said, I should explain what happens in Maori when a PrWd is too large. Evidence from loanwords suggests that roots that are too long they get broken into two PrWds. So, *owakoti* forms two PrWds: {ówa}{kóti}, with implications for stress, intonation etc.

This is unlike the examples I schematized before – in those examples, segments deleted.

So for Maori, the relevant constraint is WRAP(Root, ω), which requires every vocalic element of a root to be inside the same PrWd.

Now let's move on to considering an example in (28). The root *owakoti* is too long to fit into a single PrWd. When I say 'it's too long', I mean that no matter how we try to crush it into a single PrWd we'll violate some constraint. If we try to only build one foot over it, we'll violate LAPSE. If we try to build two feet, we'll violate the constraint *Ft, which says "Don't have non-head feet", or "Don't have secondary stress."

With these two constraints arrayed against the root, it has no choice but to split into two PrWds.

3.1 ω -Size Restrictions

- (22) Attested native root shapes: (C's are optional)
- | | |
|----------------------------------|-------------------------------|
| $\mu\mu$ | [hón̩i], [pái], [tío], [pá:] |
| $\mu\mu\mu$ | [káraŋa], [kurí:], [táio] |
| $\sigma_\mu\sigma_\mu\sigma_\mu$ | [tamáiti], [pakoire] |
| CV: $\sigma_\mu\sigma_\mu$ | [kó:rero], [ma:ori], [a:nene] |
- (23) We will leave CV:CVCV roots (e.g. [ko:rero]) aside here since they won't turn out to be significant for the passive. These are produced as {(kó:rero)}, and come about through a higher ranked constraint (CLASH) preventing the form *[{(kó:)}]{(réro)}].
- (24) *Generalizations:*
- (1) Only one heavy syllable (CVV, CV:) is allowed per root.
 - (2) Two adjacent unfooted moras are not allowed.
- (25) *Translates to:*
- Don't have a non-head foot (i.e. secondary stress): *FT-
 - Don't have an unfooted footable sequence: LAPSE-FT.
- (26) What happens to longer roots?
Long loanwords often get split up into two PrWds: e.g. {ówa}{kóti} 'overcoat'
- (27) WRAP(Root, ω) "Every moraic element inside a root must be contained inside the same ω ."
[After Truckenbrodt (1995)]
- (28) Long roots get split up into separate ω 's

/owakoti/	*FT-	LAPSE-FT	WRAP(Root, ω)
(a) {(ówa)}{(kóti)}			x
(b) {(ówa)koti}		x!	
(c) {(ówa)(kòti)}	x!		

You can compare this with a three mora form. As I mentioned before, it's fine to have a three mora PrWd. The reason its fine is because you can fit three moras into a PrWd without violating any constraints. As you can see in (29), candidate (a) incorporates the whole three moras of the root into a single PrWd without having more than one foot or leaving open a footable sequence.

That's the same for the four mora form with a medial heavy syllable, as in (30). Again, it's possible to foot this form without having two feet or leaving any footable sequences. That's why it's a possible PrWd in Maori.

(29) Shorter roots form a single ω : e.g. /karaŋa/

/karaŋa/	*FT-	LAPSE-FT	WRAP(Root, ω)
(a) {(kára)ŋa}			
(b) {(kára)}{(ŋá)}			x!
(c) {(kára)}{(ŋá:)}			x!

(30) and again for $\sigma_{\mu}\sigma_{\mu\mu}\sigma_{\mu}$ roots.

/tamaiti/	*FT-	LAPSE-FT	WRAP(Root, ω)
(a) {(ta(mái)ti}			
(b) {(táma)(îti)}	x!		
(c) {(kára)}{(ŋá:)}			x!

To summarize this section, what I've done here is identify the possible PrWds in Maori, and provided an account for them in terms of constraints.

Now let's move on to consider why we should take these statements about the maximal PrWds in Maori seriously.

[27 MINUTES]

4 Allomorphy: The Maori Passive

As I mentioned at the beginning of this talk, the Maori passive is a famous suffix. I've listed some of the principle works on it in (31). As you can see in (32), the passive suffix takes many forms: *mia*, *fia*, *hia*, *ria*, *na*, *ina*, *ngia*, *a*, and *ia*.

Hale pointed out that there are two possible analyses of this affix. One is to say that there are multiple suppletive allomorphs of the passive, and roots are marked for which one they take. This is called the morphological analysis.

The other option is the phonological analysis. This was also suggested by Hale and most fully worked out by John McCarthy in his 1981 paper. In this analysis, the passive is (usually) taken to be UR *ia*. The consonant you see popping up in most forms actually belongs to the root, so *inu* is really UR /inum/. The reason it doesn't appear as *inum* when said alone is because Maori doesn't allow coda consonants, as I mentioned before.

(31) *Previous works*: Williams (1864), Biggs (1961), Hohepa (1967), Hale (1968, 1973, 1991), Kiparsky (1971), Hyman (1975), Kenstowicz & Kisseberth (1977), McCarthy (1981), Kawasaki (1990), Sanders (1990, 1991), Harlow (1991), Bauer (1993, 1997), Blevins (1994), Keegan (1996), Kibre (1998).

(32) *The predominant issue: relates to language acquisition...*

<i>Active</i>	<i>Passive</i>	<i>Gloss (Active)</i>
inu	inumia	drink
fau	faufia	tie
apo	apohia	gather
tu:	tu:ria	begin
hoko	hokona	exchange, sell
hua	huaina	name
tohu	tohungia	show
pare	parea	ward off
maka	makaia	put

(33) *The predominant issue (raised by Hale 1968, 1973)*

Should we have a morphological or phonological analysis for the passive?

(1) *Morphological analysis*: there are many (suppletive) allomorphs in the lexicon. Each stem is marked for which one it takes.

(2) *Phonological analysis*: There is one input form of the passive (usually /Cia/ or /ia/). The form of the passive is determined by:

(i) The fact that some roots are underlyingly C-final:

e.g. /inum/ ‘drink’

So, /inum/ → [inu], but /inum+ia/ → [inumia]

(ii) and phonological rules:

/pare + ia / → [parea] by some regular rule.

However, McCarthy pointed out that there’s more phonological complexity than just adding *ia* to a root. Notice that it emerges as *ia* for *maka*, but as *a* for *pare*. Clearly we need extra phonological rules to deal with this.

In fact, McCarthy actually rejected the phonological analysis as too complex – too taxing for a learner. He came up with too many rules that applied just to the passive morpheme.

Below, I’m going to argue that really the allomorphy of the passive isn’t as complex as McCarthy argued. It really all comes down to maximal word constraints.

(34) The analysis below supports a phonological analysis.

4.1 Data

As a necessary starting point, let’s run over the generalizations that we need for the passive. In case you’re familiar with the Maori passive, it’s important to note that the generalizations I’m presenting here are somewhat different from previous descriptions. The data I base my generalizations was gathered in an exhaustive search of two Maori dictionaries—Williams and Ngata (both excellent in their own right), and much of the data was checked with and augmented by two native speakers.

- (35) *Important Note:* The generalizations presented below are based on
 (i) Two dictionaries: Williams (1971- 7th ed), Ngata (1993),
 (ii) and three native speakers (from Northland, NZ).

Previous descriptions differ on several points.

A number of generalizations emerge from the data. Since this paper is not about the Maori passive, but about maximal words, though, I'm not going to go over every interesting quirk the passive has to offer. Instead, I'm going to focus on the generalizations in (36). These are the major generalizations in any case.

Consonant-final roots – like /inum/ – take *ia*. The only exception is *n*-final roots, but they're not particularly germane to the present analysis so we'll leave them out of it.

We can divide vowel-final roots into two sorts, depending on their size. Bimoraic roots take *a*, while trimoraic roots take *tia*.

There are two important exceptions here. Unlike other bimoraic roots, those that end in [a] take *ia*. And unlike other trimoraic roots, those that end in a heavy syllable take *a*.

(36) **Generalizations**

(1) *C-Final Verbs*

C-final roots take *ia*.

<i>Root (UR)</i>	<i>Passive</i>	<i>Gloss(active)</i>
inum	{ínu} {mía}	<i>drink</i>
mono	{móno} {kía}	<i>prepare food</i>
kino	{kíno} {ŋía}	<i>dislike</i>
fau	{fáu} {fía}	<i>tie</i>
neke	{néke} {hía}	<i>move</i>
apu	{ápu} {ría}	<i>heap upon</i>

(2) *V-final Verbs*

Bimoraic V-final roots take *-a*, trimoraic roots take *tia*.

<i>Root (UR)</i>	<i>Passive</i>	<i>Gloss(active)</i>
huke	{húkea}	<i>excavate</i>
hori	{hória}	<i>cut</i>
ehu	{éhua}	<i>bail</i>
miro	{míroa}	<i>twist</i>
tapuhi	{tápuhi} {tía}	<i>sort out</i>
mahue	{máhue} {tía}	<i>leave</i>
karaŋa	{káraŋa} {tía}	<i>call, welcome</i>
kohiko	{kóhiko} {tía}	<i>interrupt</i>

(i) Exception 1: [a]-final roots take *ia*.

<i>Root (UR)</i>	<i>Passive</i>	<i>Gloss(active)</i>
hika	{hikáia}	<i>plant</i>
pona	{ponáia}	<i>tie</i>
tia	{tiáia}	<i>paddle vigorously</i>

(ii) Exception 2: CV.CVV verbs take *a*.

<i>Root (UR)</i>	<i>Passive</i>	<i>Gloss(active)</i>
horoi	{horóia}	<i>clean</i>
kopou	{kopóua}	<i>appoint</i>
tinei	{tinéia}	<i>quench</i>
marau	{maráua}	<i>remember</i>
tapae	{tapáea}	<i>present</i>
takai	{takáia}	<i>wrap around</i>

cf [CV.CV.V] roots: mahue~mahuetia, unua~unuatia.

4.2 The Proposal

[32 MINUTES]

Now, while the description of the passive's allomorphy might seem complex, its explanation is actually quite straightforward once we take maximal word restrictions into account.

What is important here is the *output* form – the form after passivization takes place. If the output form forms an acceptable PrWd, the passive doesn't change, otherwise it does, in an interesting way.

As schematized in (39), the most desirable output form of the passive is [ia]. But if adding [ia] to a root would violate the maximal word restrictions, you coalesce the [i], and try to add just [a] to the root. However, if this would still create a maximal word violation, you give up, and put the passive in a PrWd of its own, producing *tia*.

Let's take a look at the example in (40). This root is already three moras in length. So if we try to add [ia] to it in the same PrWd, we'd end up with a terrible PrWd of 5 moras in length.

Faced with a max- ω violating form, we try the next best allomorph – [a]. But, again a problem! If we add [a] to *mahue* we'll get a four mora PrWd – again, one that's banned. So, the only option left is to try *tia*, which forms a PrWd on its own. With *mahue* and *tia* in separate PrWds, we don't violate any of the maximal PrWd constraints: every PrWd is perfectly acceptable.

You can see this as a hierarchy of repairs triggered by the same condition. [...]

The most desirable output form of the passive is [ia], but if it violates the max- ω conditions, it is repaired to [a], but if this again violates the maximal word conditions, you repair it to [tia].

Before going on to show how this *works* in constraint terms, I need to mention that the *t* in the *tia* allomorphy is epenthetic. For the moment I ask you to just accept this without question, but I will present some evidence for this fact later on.

(37) Preliminaries:

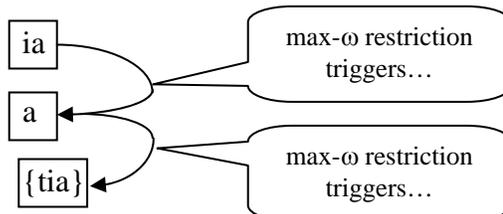
- (1) The input form of the passive is /ia/
- (2) The [t] in the *tia* allomorph is **epenthetic**. [We'll see why later on]

- It is impossible to have *ia* alone in a ω without an epenthetic [t].

(38) **Argument:**

- Passive allomorphy cares only about the *output*.
- The aim with Maori passive allomorphy is to produce a possible output ω .
- So, maximal word restrictions block certain realizations of the passive.
- The passive can surface as [ia], [a], or [{tia}], in that order of preference.

(39)



(40) **Example:** /mahue + ia/

1. *-ia*: {mahueia} = violates the maximal ω restrictions.
2. *-a*: {mahuea} = violates the maximal ω restrictions.
3. *-tia*: {mahue}{tia} = doesn't violate the max- ω restrictions.

For a constraint-based analysis, I'm going to need to mention a couple more standard constraints. One is Dep-C, which bans consonant epenthesis. Another is UNIFORMITY, which bans coalesce, as listed in (41).

[36 MINUTES]

(41) **Constraints:**

Apart from the ones identified in the previous section, we need:

- | | |
|--------------|---|
| DEP-C | “Don't epenthesize consonants.” |
| ALL-FT-L | “Align every foot with the left edge of a ω .” |
| UNIF(ormity) | “Don't coalesce.” |

4.3 Bi-Moraic vs Trimoraic Roots

Let's see how the analysis works in section 4.3. Suppose we start off with a C-final stem like *hopuk*. We have a number of reasonable options as to how we can concatenate this with the passive *ia*. One option is to put them in the same PrWd, as in (a) and (b). The problem is that we cannot do this without violating the maximal word constraints. As you see, (a) or (b) violates one of the high-ranked prosodic constraints.

Another option is to shrink the suffix, as in (c). Here, the /i/ of the suffix has coalesced with a root vowel – effectively making it disappear. You can also see this as deletion if you like. In any case, if we get rid of the [i], as in (c), we will satisfy the Max- ω constraints, but we'll violate faithfulness.

The very best thing to do here is simply put the root's final consonant and the passive into a PrWd together. This way we satisfy the Max- ω constraints and we don't violate faithfulness.

(42) C-final trimoraic roots (e.g. /hopuk/) allow the passive to emerge faithfully...

(43) *Emergence of the Faithful: C-final Roots*

/hopuk + ia/	*Ft-	LAPSE-Ft	UNIF
(a) {(hópu)(kìa)}	x!		
(b) {(hópu)kia}		x!	
(c) {(hópu)ka}			x!
(d) {(hópu)}{(kía)}			

- Incorporating the passive into the same ω as the root necessarily violates the maximal word constraints [(a), (b)].
- Coalescing the passive's /i/ violates UNIFORMITY 'Don't coalesce'. [c]
- This leaves (d): where the passive emerges faithfully.

That was an example of a situation where the passive emerges unscathed. However, in some situations no matter what we do we'll violate some important constraint, so a change is necessary.

Let's look in (44) at *hau*. This form does not take *ia* as its passive. It takes *a*.

There are two reasons it doesn't take *ia*. One is illustrated in candidates (a) and (b). In these forms we've tried to incorporate *ia* into the same PrWd as the root, but failed: doing so would violate the maximal word restriction. Unfortunately, we can't put the passive into a new PrWd either. If we did that, we'd be forced to epenthesize as I mentioned above). Epenthesis is avoided in Maori.

We do have one other option, though. We can trim the size of the passive down to just [a] and add it on to the root, as in (e). This way we do satisfy the Max- ω constraints *and* we avoid epenthesizing. Sure, we violate faithfulness by getting rid of the [i]. But in the world of OT, violating such a low-ranked constraint is unimportant.

(44) *The Next Best Thing: Coalescence – CVCV roots*

/hau + ia/	*Ft-	LAPSE-FT	DEP-C	UNIF
(a) {(háu)ia}		x!		
(b) {(háu)(îa)}	x!			
☞ (d) {(háu)a}				x
(e) {(háu)}{(tía)}			x!	

- Faithful renditions of the passive fail, as above (a), (b).
- But putting the passive into its own ω violates DEP-C “Don’t epenthesize”
- So the only option left is to coalesce: (c).

In the two sorts of root I’ve talked about so far, we’ve seen that [ia] emerges when possible, but – if blocked – [a] emerges. In the next case we’re going to look at, neither [ia] nor [a] can emerge. In this case, the least preferred form [tia], shows up.

This is illustrated in (45). Here, the root is three moras long: ma.hu.e. The last vowel sequence crucially does not form a diphthong, BTW.

Unfortunately the hand is pointing in the wrong place: it should be pointing at (e), not (a). (a) is most definitely not the most harmonic form. It is a 5- μ PrWd, and so violates the Max ω constraints. (b) is bad for the same reason.

What makes *mahue* interesting is that getting rid of the passive’s first vowel won’t save us here. We do this in (c) and (d), but *still* end up violating the maximal word restriction.

The best thing to do here – the *only* thing that will violate maximal word restrictions – is to put the passive in a PrWd of its own, as in (e). Sure, you’ll have to epenthesize a [t], but this is a small price to pay for a reasonable PrWd.

(45) *The Next Next Best Thing: Epenthesis and CVCVCV roots*

/mahue + ia/	*Ft-	LAPSE-FT	DEP-C	UNIF
☞ (a) {(máhu)eia}		x!		
(b) {(máhu)(èi)a}	x!			
(c) {(máhu)ea}		x!		x
(d) {(máhu)(èa)}	x!			x
(e) {(máhu)e}{(tía)}			x	

- The faithful forms (a-b) again violate the maximal ω constraints.
- But the coalesced forms (c-d) also violate them.
- The remaining option is to put the passive in another ω : (e).
- (Splitting the root up {mahu}{ea} is ruled out by WRAP).

(46) The examples above show that the maximal word conditions are *persistent*, and there is a hierarchy of repairs.

In a way, what I’ve just said can be summarized as follows:

Maori speakers strive to do two things:

1. Don’t coalesce the passive.
2. Avoid Epenthesis.

If they can do both without violating the maximal word restrictions, then [ia] emerges.
 If they cannot satisfy the maximal word restriction without coalescing, then fine.
 If coalescing still will violate the maximal word restrictions, then epenthesize.

Crucial to this analysis is the fact that the maximal word restriction is like a recurring headache. If you violate it, you have to do something else. But if that something else will violate the maximal word restriction again, you have to try something else.

In other words, the maximal word restriction is a persistent condition. It doesn't just trigger a process then not care about the result. It keeps hammering away at repairs until the right one emerges.

[41 MINUTES]

4.3.1 Why Does Epenthesis Happen?

Before moving on to yet another revealing complexity about the Maori passive, I want to point out section 4.3.1 to you. So far I have said “If the passive appears on its own in a PrWd it has to have an epenthetic C: i.e. [t]. Section 4.3.1 explains why that happens – it shows that the reason for this epenthesis is actually a property of the language as a whole, and not just due to the passive. I will leave this for the interested reader, though, since it doesn't directly relate to the topic of maximal words here.

You are welcome to ask me about this later if you like.

- (47) When the passive forms a ω on its own, a [t] is epenthesized:
 e.g. /mahue/ → [{mahue}{tia}], *[{mahue}{ia}].
- The idea that this [t] is **epenthetic** is extremely important to the present analysis: It explains why [horoa] and not *[horotia] is optimal.
- (48) All ω 's in Maori like to begin with an onset:
 ONSET/ σ_1 “ ω -initial syllables have onsets.”

(49)

/mahue + ia/	ONSET/ σ_1	DEP-C
(a) {mahue}{ia}	x!	
(b) {mahue}{tia}		x

- (50) Support for this generalization comes from two facts:
- (1) There are no V-initial prefixes in Maori.
 - (2) The reduplicative prefix cannot reduplicate V-initial words (Keegan 1996)
 i.e. /RED + pata/ → [papata]
 cf /RED + ara/ → [ara], *[a:ra]
- In other words, ONSET/ σ_1 blocks reduplication.

- (51) But roots don't have initial epenthesis! e.g. [a^hroha], *[^htaroha].
- The blocking constraint here is ALIGN-L(Root, σ), requiring the left edge of a root to begin a syllable.

/a ^h roha/	ALIGN-L(Root, σ)	ONSET/ σ_1
ᵛᵃ aroha		x
ᵛᵃ taroha	x!	

- (52) Is ONSET/ σ_1 a reasonable constraint?
- Prediction: some language should require epenthesis at the beginning of all ω s: e.g. Guhaṅ Ifugao (Newell 1956).

4.4 V-final Roots: Emergent Maximal ω Conditions

Let's move onto section 4.4 instead.

So far I've been talking about constraints that are easy to see in the language as a whole. We can see the effects of the constraints *Ft⁻ and LAPSE-Ft because they have an immediate and obvious effect: they constraint root size.

However, OT has a very interesting property: it allows the effects of low-ranked constraints to emerge in specific situations. In the Maori passive, we can see the effect of one of these constraints kicking in in one situation: when there are two equally good options for the output in terms of maximal words.

This emergent constraint is our old friend ALL-FT-L. Clearly, this is not a highly-ranked constraint in Maori since we do get words where feet are not leftmost. These are words with final heavy syllables, like [pi^hráu] and [ku^hrí:].

However, ALL-FT-L does exist in Maori (and in fact in every grammar), and we can see its emergent influence with some bimoraic verbs.

- (53) The constraint ALL-FT-L does not figure prominently in the preceding discussion.
- It does not play a role in defining possible ω 's in Maori, otherwise [pi^h(ráu)] and [ku^h(rí:)] would be impossible.
 - However, it does have an *emergent* effect:

ALL-Ft-L's influence is emergent because it sits quite low in the scheme of things. It lurks below DEP-C, and – though not shown here – it is ranked below WRAP, so it doesn't have any visible effect on verbs.

In this position, ALL-FT-L often doesn't influence things. But sometimes it does. Let's take the example of *horo*, a V-final root. Now the verbs we've seen so far could either take *a* or *ia* as the passive without violating the Max- ω restriction, but *horo* can take both and form a decent PrWd. In (a), for example, it takes the *ia* allomorph, and an acceptable PrWd is formed. In (b), it takes *a*, and another acceptable allomorph is formed. In fact, it can even take *tia* and still grammatical PrWds are formed.

This is a situation where any allomorph of the passive could emerge without violating the maximal word restrictions. It is precisely in a situation like this where we can see the effect of lower ranked constraints. The *tia* allomorph is ruled out by DEP. And the *ia* allomorph is ruled out by ALL-FT-L.

So, although ALL-FT-L doesn't have much of a visible effect elsewhere, it emerges in just this situation to be crucially decisive.

(54) Non-[a] final roots.

/horo + ia/	*Ft-/LAPSE-FT	DEP-C	ALL-FT-L	UNIF
(a) {ho(rói)a}			x!	
☞ (b) {(hóro)a}				x
(c) {(hóro)}{(tía)}		x!		

- ALL-FT-L is crucial in ruling out (a) *horóia*
- Without ALL-FT-L, *hóroa* would lose.

There is one further interesting fact, though. Take a look at (55). Here, again *hoka* could take *ia*, *a*, or *tia* without violating the maximal word restrictions. But, unlike *horo*, it takes *ia*! Why? Well, this is a situation where even ALL-FT-L is indecisive: both the good alternatives violate ALL-FT-L, so this is even a more extreme situation of constraint emergence.

(55) [a]-final roots

/hoka + ia/	*Ft-/LAPSE-FT	DEP-C	ALL-FT-L	UNIF
☞ (a) {ho(kái)a}			x	
(b) {ho(ká:)}			x	x!
(c) {(hóka)}{(tía)}		x!		

- Only when a bimoraic root ends in [a] will ALL-FT-L be violated in the coalesced candidate.

In (56) I show what happens to CV.CVV roots. But I'm sure you're heartily sick of Maori by now so I'll leave you to verify that for yourself.

[47 MINUTES]

(56) Similar conditions emerge in CV.CVV roots:

/kopou + ia/	*Ft-/LAPSE-FT	DEP-C	ALL-FT-L	UNIF
(a) {ko(póu)ia}	x!		x	
☞ (b) {ko(póu)a}			x	x
(c) {ko(póu)}{(tía)}		x!	x	

- Again the output is a {CV.CVV.CV} root: an acceptable ω .

- (57) Similar effects can be seen throughout the other passive forms.
- Long vowels preferentially take the faithful *ia*: e.g. [{{(to:)ia}}]. Again, they can only do so because {CV:CVCV} ω's are acceptable in M^{ori}.
 - Note that Ci: roots take *a*, though: *pí:a*, **pí:ia*. The latter is blocked by a general condition in M^{ori}: *[V_i:V_i] (reducible to the OCP).

4.5 Support For Maximal Words in Reduplication

Again for those of you who are interested, I have included some further support for the effects of the Maximal word restriction in section 4.5. Again, you're welcome to ask me about it later (and other evidence, too).

Since it isn't on the main point, though, I will move straight on to 4.6, where I summarize what I have said.

- (58) • Partial (CV) reduplicants incorporate into the ω of the root they reduplicate:
/RED + pako/ → [{{(pápa)ko}}]
- But in doing so, they form a maximal word.
 - So if we added the passive onto this reduplicated form, we would necessarily violate the maximal word constraints: e.g. [{{(pápa)koa}}].

(59) So what happens?

- (1) Either the reduplicant does not appear (Bauer 1993, Keegan 1996), or
(2) it infixes.

<i>Active</i>	<i>Passive</i>	<i>Gloss</i>
<u>k</u> ukume	ku:mea	pull, drag
<u>n</u> onoke	no:kea	hustle him
<u>p</u> upuhi	pu:hia	blow, shoot

- (60) The infix form does fit in with the ω restrictions: {CV:CVCV} is an acceptable ω in M^{ori}. In other words, the need to have a reduplicant at the left edge of the ω is overridden by the minimal word constraints.
- (61) The only place that the passive does appear is reduplicants and affixes that form their own ω:
e.g. full reduplicants: [{{kata}}{katáina}], [{{huki}}{hukia}] 'roast on spit'
causative + Root: [{{faka}}{toaia}] 'd disdain', [{{faka}}{pipia}] 'pile up'

4.6 Summary

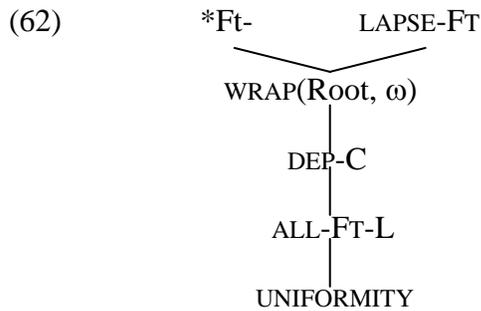
In 4.6, I summarize what I have just said.

If you don't do OT every day, this is likely to be one of the most opaque and uninformative summaries you've ever seen.

To make it less opaque, what the ranking says is this:

1. The Maximal word restriction is paramount in Maori, as effected by the two constraints at the top of the hierarchy.
2. You can do various things to retain Max- ω restrictions.
3. But violate uniformity first.
4. If that doesn't help, violate ALL-FT-L.
5. If that doesn't help, violate DEP, and epenthesize.
6. If *that* doesn't help, then violate WRAP, and break the thing up.

[



So, what moral can we draw from the Maori analysis?

Well, I hope – even if you don't like my constraints or ranking, or even OT – that you now think that maximal word restrictions are real.

I've also shown that maximal word restrictions – like minimal word restrictions – are not the result of a single condition, but a number of conditions working in tandem.

I've also argued that these conditions are violable, but not violable in the uninteresting sense that some languages obey them and some don't: violable in the *interesting* sense: while the language doesn't obey them generally, they can emerge in specific contexts.

I argued this was the case for ALL-FT-L. Even tho' the language doesn't obey this constraint generally, its effect emerges in some situations.

[TIME: 48 MINUTES].

[

I will stop here since my time is up.

But before I end I want to say something about a responsible OT analysis. A responsible OT analysis not only presents a set of constraints to deal with the problem, but has to show 2 other things:

1. That the constraints do not produce undesirable effects and
2. That other commonly accepted constraints do not interact with your new constraints to form undesirable effects.

I lack the time to be responsible here, so my handout will be responsible for me. In section 6 I talk about what constraints we can and cannot have. But again, I leave that for the interested reader, and hope the rest of you will not think me an irresponsible analyst in doing so.

Thank you.

]

(63) My aims were to show that maximal word restrictions

(i) are not effected by a single constraint

(ii) are violable

(64) ☞ The fact that DEP-C must intervene between LAPSE-FT & *FT⁻ and ALL-FT-L shows that the restriction is not a single constraint.

☞ That the effect of ALL-FT-L is emergent shows that the constraints are violable.

5. Typology

Although we have just looked at Maori, it's never enough in OT to propose a set of constraints and show that they work for a language. Since constraints are universal and ranking permutation is free, I have to show that every possible ranking permutation produces a possible grammar. Similarly, I have to make sure that *no* constraint in CON interacts to produce an impossible grammar.

In this last section, I'm going to talk about the typology of maximal word conditions – what we can and cannot have.

-
- (65) In OT, it's not enough to come up with a set of constraints to deal with a single language.
- Since constraints are universal and permutation is unrestricted, every constraint ranking must produce a possible grammar.
 - Similarly, no ranking may produce an impossible grammar.
-

A typology of maximal- ω restrictions are given in table (66)?.

It's important to note that the *effect* of the maximal word restrictions on morphology will differ from language to language depending on how PrWds relate to morphological constituents. Some languages put roots in a PrWd of their own, and affixes are adjoined to the outside – so any maximal PrWd restriction will only have an effect on roots, not on words alone. Other languages make PrWds coextensive with morphological words, so any maximal word restriction will have effects on overall word size, not just root size.

In other languages, maximal word restrictions are emergent – they don't affect normal roots, but will appear in specific morphological situations, most commonly reduplication.

(66) Typology of Maximal Word Conditions

<i>Restriction</i>	<i>Language</i>	<i>Reference</i>
bimoraic ω only	Applies to all roots: Applies to all reduplicants: <i>many</i> .	
trimoraic ω only	Ura, Yoruba??, Maori	Crowley
4- μ ?	Japanese truncations?	??
>4 μ	-	-

There are a couple of things to note about this typology. One is that I don't have a large number of languages in it so results may be seen as a bit preliminary. However, when a language does have a maximal word restriction, it usually sets the limit at 2 or three moras. I haven't found a language that has either overt or emergent restrictions set at four moras, or more than four moras.

Sure, Maori does allow 4 mora PrWds, but in this table, I'm focussing on words with all light syllables.

If it turns out that maximal word restrictions can only put a 2 or 3 mora maximum on a PrWd, then I have an explanation. If they dominate faithfulness constraints, the

constraints I've talked about so far will force foot structure in a PrWd to be minimal – i.e. one foot in size. Then, the other constraints will interact to determine whether the PrWd should be coextensive with the foot or not. If the former, they will be bimoraic, as we say in section 2. If the latter, then at best the PrWd can be trimoraic (if the foot is at an edge). If it's 4 moras long, we can fit two Feet in – a fatal situation in terms of these constraints.

In other words, the constraints I've used here today *minimize*, so an acceptable PrWd can never have more than the minimum number of feet, and minimum number of stray unfooted syllables.

- (67) In section 2 I showed how the constraints could produce bimoraic restrictions, trimoraic restrictions, and the more complex Maori-type restrictions.
- It is not likely that there are higher restrictions: once languages allow more than 3 moras, they seem to allow anything.
 - Statements like “Roots are bi- or tri-moraic” are common in grammars, but statements like “Roots have 5 moras or less” are not common at all.
- (68) The constraints used here predict this to be the case.
- Together, ALL-Ft-L, LAPSE-Ft, *Ft- allow bimoraic and trimoraic forms but necessarily penalize longer forms. There is no ranking of these two constraints that will allow 4- μ CVCVCVCV forms but penalize longer ones.
- (69) If a constraint penalizes a candidate with n moras, then – all else being equal – it must penalize all candidates with $>n$ moras.

5.1 Anti-Odd-Parity Systems

But it's not enough to say which constraints exist in CON. In the last few minutes of this talk, I'm going to talk a little about what CON must not contain.

Many of you familiar with OT will probably know the constraint in (70). PARSE- σ is unlike LAPSE-Ft in that it requires full footing. Every syllable has to appear inside a Ft.

Unfortunately, such a constraint cannot exist in the light of maximal word restrictions. The reason is given in (71). Both Brett Hyde has shown in detail that PARSE- σ creates a strange sort of restriction that's relevant for maximal words. It can be used to require a language to have PrWds with even numbers of syllables only – odd-parity words are banned.

You can see this in tableau (72). It's better here to turn a 3- μ word into a 2- μ word so every syllable is footed. In comparison, in tableau (73) a 4- μ word ought to stay the same since every syllable can be footed.

- (70) PARSE- σ “Every syllable must appear inside a foot” (P&S 1993)

(71) Hyde (1999) and Hall (2000) have pointed out that PARSE- σ can produce a system that allows words with even numbers of syllables only, but bans odd-parity words.

(72) Odd parity forms \rightarrow Even parity

/pataka/	PARSE- σ	FTBIN	MAX
☞ (pata)			X X
(pata)ka	x x!		
(pata)(ka)		x!	

(73) Even parity \rightarrow same.

/patakati/	PARSE- σ	FTBIN	MAX
(pata)kati	x x!		
☞ (pata)(kati)			
(pata)(ka)		x!	X

As Hyde has argued, this anti-odd-parity-only situation is one we want to avoid: our grammar should not be able to produce it.

In this case, the problem is fairly easy to fix: if we get rid of PARSE- σ we won't have any difficulties. Of course, we still need a constraint to encourage footing, and that's where LAPSE-FT comes in. LAPSE-FT doesn't ever require *full footing*, but rather requires footable sequences to be footed. As we've seen above, LAPSE-FT will treat bi- and tri-moraic syllables alike. Unlike PARSE- σ , then, LAPSE will not create the anti-odd-parity system that PARSE- σ produces.

The point of the preceding discussion is that Maximal Word restrictions tell us something about CON. They not only tell us what sort of constraints we need, but what sort we don't need. And the results are somewhat surprising, if you're an avid OT-person: we have to get rid of a commonly accepted constraint PARSE- σ .

- (74) • This condition is a maximal ω constraint of a very specific sort. So we need to eliminate it from the grammar.
 • In this case, we can eliminate the problem by eliminating the constraint (a rare occurrence). If there is no PARSE- σ , there is no problem.
- (75) Note that we cannot just eliminate PARSE- σ , but we can make a general statement about what is in CON: there is no constraint that penalizes two adjacent unstressed syllables (i.e. no LAPSE, either).
- (76) However, we still need something to encourage footing:
 i.e. LAPSE-FT "Assign a violation if a candidate has two adjacent unfooted syllables."
- (77) What LAPSE-FT cannot do is force full footing. It will not favour fully-footed {(pata)(ka)} over partially footed {(pata)ka}. This turns out to be a good thing: Hayes (1995) argues that there really are no languages with exhaustive foot parsing. All cases that look like this can be analyzed as having a degenerate head

foot: [(pàta)(ká)]. Here, the requirement of main stress to be at the right edge forces the syllable to be footed.

- (78) The other use for PARSE- σ has been foot-conditioned allomorphy. But in most cases, these seem to be reducible to stress-attraction conditions rather than footing requirements.

6 Conclusions

So, let me conclude this talk. I've argued that there is an empirical basis for maximal word conditions. Maori does have an active maximal word condition that can be seen in the passive. It can also be seen in many other areas of Maori phonology and morphology too, BTW.

We've seen that maximal word restrictions can constraint root and word size under the right conditions, and affect allomorphy.

We've also seen that maximal word conditions can inform us about what can't be a constraint. Importantly, dealing with maximal word conditions – like dealing with everything else – is not just a matter of tacking a constraint on to OT. Instead, max- ω conditions inform us about what is a possible constraint, requiring us to eliminate PARSE- σ type constraints.

I'll close by saying that while people haven't talked about Max- ω conditions before in any detail, the idea that prosodic conditions can have maximum sizes isn't remarkable. IN fact, most people believe that syllables – universally – can have a bi- or tri-moraic maximum, and that feet also have a bi- or tri-moraic maximum. In fact, even Prosodic Phrases have been argued to have maximum limits in some languages.

So, What I've proposed today is – when all is said and done – quite unsurprising.

- (79) There is an empirical basis for maximal word restrictions.
They can constrain root size,
and affect allomorphy.
- (80) CON cannot contain constraints that penalize odd-parity words only.
If a constraint C penalizes a candidate with n -moras (for having n -moras), then all else being equal, it C must penalize candidates with $>n$ moras.
- (81) Maximal conditions at other levels:
- σ 's may contain 2 moras at the maximum (at least contrastively)
 - Feet may contain 2 syllables at the maximum (or 3, or unbounded)
 - Phonological Phrases: may have a binary maximum (Selkirk & Tateishi 1988)

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(82)	<i>Allomorph</i>	<i>Root Shape</i>	<i>Example</i>	<i>Gloss(Active)</i>	<i>Number of forms</i>
<i>Bimoraic</i>					
□	[ia]	CVCa	hoka+ia	<i>run out</i>	42 ²
□	[a]	CVCV ^{-LOW}	horo+a hau+a	<i>fall in fragments</i> <i>strike</i>	410 ³
□	[ia]	CVCVC	inum+ia	<i>drink</i>	132
<i>Trimoraic</i>					
□	[tia]	CVCVCV	mahue+tia	<i>put off</i>	66 ⁴
□	[ia]	CVCVCVC	koharak+ia	<i>split open</i>	9
□	[a]	CV.CVV	kopou+a horoi+a	<i>appoint</i> <i>clean</i>	10 ⁵
□	?[tia]	CVV.CV	taute+tia	<i>consider</i>	?
□	[a]	CV:.CV	pe:hi+a	<i>oppress</i>	7
□	?[a]	CV.CV:	tapi:+a	<i>mend</i>	2
<i>/n/-final roots</i>					
□	[ina]	(CV)Can	pana+ina	<i>thrust</i>	25
□	[a]	CVCV ^[-LOW] _n	tahun+a kukin+a	<i>burn</i> <i>cook</i>	38
<i>Long Vowel Roots</i>					
□	[a]	Ci:	pi:+a	<i>bathed</i>	6
□	[ia]	C{e,a,o,u}:	pa:+a ko:+a pu:+a	<i>block up</i> <i>dig, plant</i> <i>make into a bundle</i>	12 ⁶

- Cs are optional.
- VV = *diphthong*.
- V: = *long vowel*.

² Williams had 11 exceptions, where the termination was *-a* (e.g. *ranga~ranga*: 'charge'). Of these, 7 are recorded with alternate endings (either *ina* or *ia*). Of the 7 words that were also in Ngata's dictionary, all were recorded by Ngata with *-ia* endings.

³ There were 6 exceptions that took *-ia* (e.g. *noho~nohoia*). Of these, two verbs had alternate forms, and Ngata records another two with the *-a* ending.

⁴ 19 CVCVCV forms take *-a* as the passive. Of these 19, 6 are morphologically complex: *ko+Root*, as are another two (*takah+i*). The latter prosodify as {(táka)}{(hía)} in any case. The remainder are either (i) marked as exceptional or questionable in Williams, (ii) listed as taking *tia* in Ngata, or (iii) not corroborated by Ngata.

⁵ There were a total of 13 CVCVV verb forms found, with the remaining 3 taking *tia*.

⁶ Ngata has one exception: *hu:a* 'erupt'.

6. Prepare for questions:

- e.g. - what about *na, ina*?
- what about the gerund?
- what about Hale's generalizations?

7. Think about what needs to be in the handout vs what you need to say.

8. Write the talk out in full.

- (83) (i) How do we know that the max- ω approach is right? Couldn't the passive be conditioned by something else?
 (ii) Why do we need OT to do the Maori passive?
 (iii) What about the morphological approach?

5.1 Foot-Sensitive Allomorphy

(84) Couldn't we say that there are two allomorphs – *ia* and *a* – and that they are sensitive to prosodic structure?

(85) **Problems**

-*ia* attaches anywhere, prosodically speaking:

1. adjacent to a foot: {(tu:)ia}
2. inside a foot: {pa(rai)a}

5.2 Serialist approach

At this point, I really can't resist saying something about OT. I like OT, as you may have guessed. But I have a better reason than just liking it for wanting to analyze the passive using it.

OT is ideally suited to dealing with a problem like the passive because it involves something called a *persistent* or *global* rule or condition. Steve Anderson wrote a book about this in (1974). He pointed out that some rules/conditions seem to crop up at several points in the derivation. So, Rule X might apply

(86) Serialism and Globality

- In serialist terms, the maximal ω constraints are *global* or *persistent* (Anderson 1974).
- These global conditions trigger a hierarchy of repairs: first coalescence, then ω -reformation.

(1) Input: /patu + ia/ max- ω triggers	1. build ω 2. coalescence	{patuia} {patua}
(2) Input: /mahue + ia/ max- ω triggers max- ω triggers and then	1. build ω 2. coalescence 3. reverse (2) 4. rebuild ω 5. epenthesize	{mahueia} {mahuea} {mahueia} {mahue}{ia} {mahue}{tia}

In the derivation in (2), the same condition triggers two different repairs: coalescence and epenthesis. Epenthesis must be marked as the least preferred repair.

This is easy to do in OT: || *R1/K, trigger » *R2 » *R1 ||

- (i) “R” = ‘repair’
- (ii) *R1/K bans repair1 in context K.

- (87) In other words, the same rules/constraints must recur at different points in the derivation.
- The ‘opposite’ to global conditions is opacity: where a condition triggers a repair at one point in the derivation, but fails to trigger it at another point (roughly).
- (88) Conclusion: Conditions on the Maori passive care about *output form*.

5.3 The Morphological Analysis

- (89) I have assumed that the Phonological approach to the Maori passive is the right one.
- The morphological approach leaves a lot of phonological regularity unexplained:
- Why C-initial allomorphs always have the form *Cia* and not *Ca*.⁷
 - Why the V-initial allomorph is always *a* after V^{-LOW} and *ia* after [a]
 - Why CVCVCV roots always take *tia*
 - Why CVCVV roots always take *a*.
 - Why the gerund takes the same C: e.g. [inumia~inumaiŋa]
 - Bimoraic loanwords take *-a* in the passive, but longer ones take *tia* (Blevins 1994).
- (90) Nevertheless, McCarthy (1981) argued that the main problem with a phonological approach is the complexity of the phonological processes needed to deal with one (or two) affixes.
- (91) In the present approach, though, there are very few rankings that rely on evidence from the passive.
- The max- ω constraints are needed to limit root size in any case.
 - The constraints that effect C-epenthesis are needed to limit reduplicant and affix shape.
 - In short, (most aspects of) the passive’s allomorphy falls out from the ranking already needed for other processes.

⁷ Excepting /n/-final forms.

Questions

1. What other things in Maori tell you about Max- σ ?
 - There are a lot of length variations: mono- bimoraic. And *e*...
 - *e* allomorphy.
 - e* tu:
 - **e* karanga
2. If you eliminate PARSE- σ , what about full footing?
 - There is no full footing.