A Correspondence Theory of Epenthetic Quality

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¶ The Issue

The Subject of our talk today is epenthesis. As you all know, an epenthetic element is a surface segment without an underlying correspondent. Epenthesis happens for a variety of phonotactic reasons. The focus of our talk, though, is on the *quality* of epenthetic segments -- i.e. their featural content.

The quality of epenthetic elements varies from language to language. One possibility -- called 'copy epenthesis' -- is for an epenthetic segment to be a copy of a nearby segment. The examples we have in (1) are from Maori loanword epenthesis. As you can see, the epenthetic vowels -- shown underlined -- in the first word [pih̲ike̲] are copies of the vowel to their left.

(1) NZMaori (Kitto 1997)

biscuit /bɪskɪt/ → [pih̲ike̲]

Of course, this sort of process is not limited to loanword epenthesis; we simply cite this case since it is from an Austronesian language -- we will encounter a number of other cases of non-loanword copy epenthesis at various points during this talk.

Copy epenthesis poses a problem for theories of feature geometry.

These problems are shown graphically in (2). As you can see in (2a), the spreading of a lot of vowel features (in fact,the place node here), across a consonant is

only possible when the consonant is featureless-- [h] or glottal stop. When the consonant has features as in (2b), line-crossing inevitably occurs, a fatal result.

There have been a few attempts to account for this, like putting vowels and consonant on different planes. This raises a number of empirical problems, though, as Hume (1992) has pointed out. This is also problematic from an OT perspective since V-C planar segregation is derivational: Vs and Cs are first on separate planes, and then the planes must be conflated at a later stage in the derivation. Variations on the VC scheme have been proposed. For example, Hume (1992) and Clements & Hume (1995) have argued for a more limited segregation: vowel place and height features extend beyond consonantal features, so allowing them to look over consonants. The problem with this is that other features like [nasal] are predicted to *not* spread in total vowel copy, but they do in some languages (e.g. Winnebago).

In any case, our aim is not to talk about other theories but to simply point out that total vowel epenthesis is a problem in need of a solution. The aim of the rest of this talk is to present our own views on the subject.

¶ Proposal: The Correspondence Theory of Epenthesis

Q0 To deal with copying epenthesis - we propose that there is a *correspondence* relation between the epenthetic element and another *output* segment. This correspondence relation parallels those that exists in reduplication: just as a reduplicant corresponds to output segments, epenthetic elements also correspond to output segments.

¶ Correspondence

This is illustrated in (3) where /al/ –> [al<u>a</u>]. Here, the epenthetic element is in a correspondence relation to the output segment [a]. This is indicated by the subscript 1's. Compare this with reduplication in *patapata*. Just as in reduplication, we will refer to the elements that are copied as the 'Base'.

A number of constraints affect correspondence relations. The most important for the purposes of my part of this talk is BE-IDENT-F.

BE-IDENT-F requires that the epenthetic element and its 'base' -- the thing it corresponds to -- must be identical in terms of feature F.

Note that two things in correspondence don't *have* to be identical, as we shall see below.

By the way, Correspondence Theory was originally proposed by McCarthy & Prince (1995), and was employed by them to account for copying between Reduplicants and their Bases. They pointed out, though, that Correspondence also holds on a number of other dimensions, including Input-Output and Output-Output.

In this context, the essence of our proposal is simple: correspondence relations can hold between output segments. Our proposal, then, is somewhat minimal: we are not introducing new constraints, just a new dimension for them to hold over.

Correspondence constraints are also called faithfulness consraints. We'll use these terms interchangeably.

¶ Aims (of the talk)

So, the aim of this talk is to explore the consequences of this idea.

Q0 We will focus on the following two aspects of our proposal:

→ the typology of vowel quality, how a Correspondence Theory can account for copying epenthesis *and* default epenthesis.

→ the nature of the *base* in the correspondence relation, -- how do you determine what is copied, and what implications does this have.

Since this is a conference on Austronesian linguistics, the empirical theme of this talk will be epenthesis in Polynesian languages. Almost all epenthesis is found in loanword formation -- the data is based on my own fieldwork. It must be borne in mind, though, that the examples we will discuss are merely representative – the same processes happen to non-loanwords in other languages.

¶ Copying versus Markedness

A) Faithful Copy

Q0 *Faithfulness* constraints -- those that militate to demand identity between corresponding things -- conflict with *Markedness* constraints – constraints that prefer unmarked values for segments. The conflict between these is fairly self-evident: being faithful is used to preserve marked structure.

Q1 If Faithfulness constraints outrank Markedness constraints the result is perfect copying, in other words: complete faithfulness to the base. This is illustrated in reduplication by Maori RED + *pata* → *papata*. Here, the Reduplicant has faithfully copied the base segments. It has disregarded markedness constraints, like those that require all vowels to be [i]. This is illustrated in tableau (6). Faithfulness outranks the markedness constraint V→i, which indicates that [i] is the most unmarked vowel.

Q2 Tableau (7) shows the same outcome for an epenthetic element. The ranking of faithfulness above markedness results in the total copy by the epenthetic segment. The point of this comparison is to emphasize the similarity between the processes we are proposing. This isn't just a feeble attempt to make a connection with the theme of this conference: the *mechanism* that we are proposing for epenthesis – i.e. correspondence – is exactly the same as that used for reduplication. Because of this, we are predicting that the same phenomena that happen in reduplication also happen in epenthesis, as we will point out at various points in this talk.

(2) ‖FAITH » MARKEDNESS‖ **Copying Epenthesis/Reduplication**

(a)

NZMao/o:kan/	FAITH-BE	M(Vowel → i)

☞ o:kana		✹
o:kani	✹!	

(b)

RED + /pata/	FAITH-BR	M(Vowel → i)
☞ papata		✹
pipata	✹!	

B) Emergent Markedness

Q0 In the tableaux above, it is evident that faithfulness constraints and markedness constraints are *in conflict* – the satisfaction of one entails the violation of the other. Because of this, if the ranking is reversed the opposite result is achieved: in the present case having the vowel [i] is better than copying. For reduplicants, this ranking produces cases of 'fixed segmentism'. An example is given in (8): in Yoruba, the vowel of the reduplicant always appears as [i]: e.g. *dara* → *didara, *dadara*. Tableau (9) shows how this is achieved: the desire to be [i] outweighs the need for a faithful copy.

Q1 The same situation holds for epenthetic elements, as shown in tableau (10): these are cases of 'default' epenthesis.

Q2 Again, we emphasize that the same typology of copy *vs* default occurs in reduplication, just as is does in epenthesis.

(3) ‖MARKEDNESS » FAITH‖ **Emergent Markedness Epenthesis/Reduplication**

(a)

Tongan/o:kan/	M(Vowel → i)	FAITH-BE

☞ o:kani		✹
o:kana	✹!	

(b)

RED + /pata/	M(Vowel → i)	FAITH-BR
☞ pipata		✹
papata	✹!	

This last case makes an important point: there are no such things as parameters in OT. For epenthesis it is not a simple case of chosing copy or default to fill in epenthetic features. Rather, there is a spectrum of choices, running from fully faithful copying, through partial copy, to default segmentism. As shown, this spectrum can be captured by constraint ranking.

¶ Partial Copy

Q0 In OT, there are no such things as parameters. Typological difference results from the reranking of constraints. For epenthesis, this opens up the possibility that there are systems that are neither entirely copy nor entirely default, but a mixture. We call these cases 'partial copy'.

Q1 An example is found in Yoruba loanwords: the epenthetic segment is always a high vowel, so the relevant markedness constraint ('vowels shouldn't be non-high') is ranked above faithfulness. However, apart from always being high, the epenthetic vowel *copies* the frontness or backness of a nearby vowel. Here markedness and faithfulness constraints are intermingling to produce a *partial copy*.

(4) **Partial Copy in Epenthesis**

❶ /pek/	*-high	BE-IDENT-F	M
☞ peki		✸	
peke	✸!		
❷ /pok/	*-high	BE-IDENT-F	M
☞ poku		✸	
poko	✸!		
poki		✸✸!	

G0 M represents the other markedness constraints, e.g. *round.

G1 This example makes an important point: the difference between copy *vs* default is not merely a matter of corresponding *vs* not-corresponding. Here, part of the epenthetic element is default, yet it is still in correspondence with something else.

¶ Contextual Copy/Default

Related to partial copy is the fact that the effect of a constraint can be *blocked in certain environments* by a higher-ranked constraint. This is known as the "do *x* except when" situation, discussed by Prince & Smolensky (1993). Such situations are very common in languages. They are accounted for by ranking a specific blocking constraint *y* above the constraint responsible for the more general process – *x*. This means that *y* will block *x*'s effect in a specific circumstance. In this situation, the effect of a lower-ranked constraint *z* will emerge. Translating prose into constraints then, "Do *x* except when *y* then do *z*" is expressed as the ranking ||*y* » *x* » *z*||.

The "Do *x* except when" situation will be a recurrent theme throughout the rest of our talk. It occurs in many cases of epenthesis. A rather straightforward example is found in Maori.

In Maori, epenthetic vowels are a copy of preceding vowels. We saw this in examples like *pihikete* on page 1. There is one caveat though, [fu] sequences are banned in Maori (de Lacy 1999). e.g. *hoof* is [hufi] 'hoof' not *hufu. This is a "Copy, except when [fu] then default to [i]" situation. Since Copy is effected by faithfulness constraints, the constraint against [fu] sequences -- *fu – must outrank faithfulness. The high-ranked *fu blocks copy just in the situation where this would produce an [fu] sequence. This allows the lower ranked constraint M(V→i) to emerge, producing an epenthetic [i]. This is shown in tableau (15). The fully faithful *hufu* satisfies faithfulness at the expense of *fu.

(1) "Copy, except when *fu, then default to [i]"

/huf/	*fu	BE-IDENT	M(V → i)
hufu	x!		x
☞ hufi		x	

This is a case of 'contextual copy epenthesis': when copy epenthesis takes place in certain environments, and default in others.

A more spectaclar example, and the one we've been leading up to, is found in Cook Islands Maori, which is a distinct language from Maori.

In CIM, the epenthetic element is usually [i]. This is shown in the data under (17) on the handout. However, this is blocked in a certain situation: when the epenthetic vowel would appear after [r]. As shown by *pere* "bail" and *a:para* "apple" copying takes place after [r]. At this point we have a situation of "Default except when r, then copy." However, the situation is more complex than this: after an [ir] sequence, copy does not take place. Instead, an [a] is epenthesized, as in *pira* 'bill'.

By the way, this fact shows that this isn't a simple consonant transparency effect. Instead, there is obviously an active prohibition against [ri] sequences.

What is happening here is that the [ri] prohibition motivates the choice of a hierarchy of repairs. At the top of the list is default insertion of [i]. If this would produce [ri], though, *copy* is next on the list. If *copying* would produce [ri], though, insertion of the next most default vowel [a] occurs.

This can be plugged into the constraint schema rather straightforwardly as shown in tableau (19): the usual case is to default to i, so M(V→i) is the 'middle constraint'. [ri] sequences are banned, so *ri outranks M(V→i). Since copy is emergent here, BE-IDENT ranks below these constraints. Example 1 shows a normal case with default to [i]. Example 2 is a case where the illicit [ri] sequence threatens to emerge. Of course, copying takes place here to avoid this.

The final step is shown in tableau (20). In the case that *both* M(V→i) and BE-IDENT are blocked, the lower ranked M(V→a) emerges to produce a default [a]. This is shown for *pira*.

The point of this example is that markedness constraints – like *ri and M(V→i) – can interact with BE-faithfulness constraints to produce cases of contextually triggered copying and default. This result supports the idea that correspondence is indeed releant in epenthesis.

The CIM case also deserves some comment from a more general point of view. We have been assuming an OT framework, but why should we? Is this just an arbitrary decision? We don't think it is: the CIM case shows that OT is superior to other non-parallel theories. The crucial aspect of the CIM case is that it employs a 'global condition'. The global condition is that [ri] sequences must be avoided. This global condition then chooses between the hierarchy of choices of (1) default to [i], (2) copy, and (3) default to [a].

Other theories do not deal with situations like this very well. An entirely rule-based version of CIM epenthesis is given in (23). It is obvious at a glance that this sort of characterisation does not express the fact that it is avoidance of *ri* sequences that motivates the disjunctive character of this rule. It is entirely coincidental in this formulation that /a/ is epenthesized after /ir/ sequences and that the vowel is copied after other V+r sequences. The same general point that we are making has been made by a number of other authors too. In fact, Krause makes the same point for Chukchi epenthesis, and Wilbur makes the same point for reduplicative processes.

It is not just a problem with *rules* in this case. Even using constraints won't help.

A serial theory with constraints equally doesn't capture the global condition. In (24) we give an informal implementation of a serial theory with constraints, which locally trigger repairs. The point to note here is that the same constraint is invoked twice: once to trigger copying, and the other time to trigger epenthesis of [a]. This is surprising in such a theory since the same constraint appears in two distinct places. And what this fails to capture is that there is a relation between the two constraints – it is entirely arbitrary in this system that *ri triggers both processes. It is equally possible that *ri could trigger one and an entirely different constraint the other.

As we've illustrated with CIM, though, OT can capture such cases of 'global conditions'. This is one of the reasons why we consider it superior to other analyses. This point is also important to epenthesis and its relation to reduplication. McCarthy & Prince (1995) and other authors have shown that global conditions acting on reduplication can be explained in OT. We find a parallel to this in epenthesis here.

As a final note, this situation of "do *x* except when" in epenthesis is attested in non-loanword epenthesis. A case from Sentani is briefly described on the handout.

¶ Summary

G0 The aim of the last few sections was to show how correspondence and epenthesis can work together to produce a typology of epenthetic qualities. The interaction of markedness and faithfulness constraints produce a spectrum of possible qualities, from copying through partial copy to default.

G1 Also, it was shown that copying can be contextually triggered and that the interaction of markedness and faithfulness constraints give a rather straightforward account for this.

G2 Another point is that epenthesis parallels reduplication: like epenthesis, reduplication has cases of fully faithful copy through to default segmentism, as discussed at length by Alderete *et al* (in press). Similarly, there are cases where full copy in reduplication is contextually determined, similar to

Rarotongan (as discussed by Alderete et al.).

G3 I have presented one aspect of the epenthetic picture – namely what the epenthetic element looks like. We will shift the focus of this talk now: Paul will talk about what the epenthetic element corresponds to – the 'base' of epenthesis.

4 The Dynamic Definition of Base

Catherine has talked about *the epenthetic element* – whether it copies or defaults, or does something inbetween. My job is to talk about the other aspect of our proposal – *the 'Base'* -- the thing that the epenthetic element copies. In our proposal, identification of the Base is crucial. After all, correspondence is a relation between two things, hence knowing what the other thing is tends to be important.

- Crucial to the epenthetic element is its *Base* – the segment that the epenthetic element corresponds to.

The questions I will be concerned with are

- What is the Base? and, more importantly, how is it determined?

In reduplication, the Base has what we will call a 'static' definition:

- In Reduplication: The *Static* Definition:

  "The Base of a reduplicant is the nearest accessible string to the reduplicant" Most of this formulation is due to McCarthy & Prince 1995, the "nearest accessible" bit is due to me, and I'll be justifying this in my fascinating talk on Sunday (Here's some shameless self-promotion).

  The important point to note about the Static Definition is that the identity of the base is not just an epiphenomenon of constraint ranking. It is overtly picked out and 'pre-defined' *before* – in a certain sense – the candidate forms enter the constraint component.

  Our proposal is somewhat different. We call it the dynamic definition, and can be informally stated as in (26) on your handout: "The base of an epenthetic element is the 'best' segment possible." 'Best' is defined in terms of constraints.

  To elucidate this a little:

- GEN produces candidates with correspondence relations between output segments.
- The candidate with the most harmonic correspondence relation is chosen, where harmony is determined by constraints.

To give a very brief sense of what this means, take the example in (27). Underlying /ek/ surfaces as [eke]. This epenthesis is driven by the phonotactic constraint NOCODA. The question is, why does the epenthetic element correspond to [e] and not [k]? Well, suppose it did correspond to [k] and had to be fully faithful. You would end up with [ekk], which really defeats the purpose of epenthesis in the first place – you're not avoiding NOCODA violations. The 'best' thing to do here in terms of constraints is to copy the [e]. This way you get to satisfy NOCODA. In this way, [eke] is 'better' than [ekk] since it satisfies the constraints – i.e. NOCODA – better.

This is a rather trivial example, we'll see some better ones in a moment. Even so, it's enough to illustrate our point: This reduces the notion of 'Base' to an epiphenomenon of constraint ranking – there is no need to invoke a separate identification mechanism for the 'Base' – the Base of epenthesis is simply that segment that stands in correspondence with the epenthetic element.

4.1 The Aim of this section

With this in mind, the aim for this section is to explore the consequences of a dynamic definition of Base. The most obvious characteristic of such a definition is that the 'base' can be different in different environments. The constraints that trigger these differences are of 5 different sorts, summarized in a rather informal manner below.

- To explore the typological consequences of reranking constraints that affect the identity of the Base.
- Note: For ease of exposition, **E** stands for 'epenthetic element' and **E'** for 'correspondent of **E**'.

- Relevant Base-Epenthesis Constraints:

(1) *Direction*: COPY-L/R "**E** corresponds to an element to its left/right"
(2) *Locality*: BE-ADJACENCY "**E** and **E'** are as close as possible."
(3) *Identity*: BE-IDENT-*f* "**E** agrees with **E'** in terms of *f*."
(4) *Correspondence*: BE-CORR "**E** corresponds to something."
(5) *The Trigger*: Whatever constraint (ONSET, NOCODA) forces epenthesis.

- The focus of my part of this talk is somewhat like Catherine's:

What do these constraints predict will happen in a "do *x* except when" situation? e.g. "The base must be to the left of the epenthetic element except when *y*, in which case *z*…." || *y* » COPY-LEFT » *z*||.

"Do *x* except when" situations are the places when we expect to see some 'base dynamism". In particular, we will look at cases of contextually controlled "direction" changing – hardly something a 'static' definition would predict.

One thing I won't be talking about is cases of 'dynamic adjacency' -- where the distance between the epenthetic element and the base varies contextually. We won't have the time to talk about those, but information on this will be posted on my webpage.

4.2 Direction

(1) Basic Typology

In any case, let's start with some basic facts about direction in 4.2.

Languages differ as to whether they copy from the left or right. There seems to be no asymmetry in this, with almost as many clearly left-copying languages as there are right-copying ones. In Takelma and Wolof, for example, copying takes place to the left. In Winnebago and Bardi, onthe other hand, vowels to the right are copied.

(i) Left Copy

- Takelma (Sapir 1922):
  /sensan/ → [sen<u>e</u>san], /dült:al/ → [dül<u>ü</u>t:al], /i:gaxgixi'n/ → [i:gax<u>a</u>gixi'n]

- Also in Wolof (Ka 1994)

(ii) Right Copy

- e.g. Winnebago (Miner 1992), Latin, Sardinian, Ponapean, Bardi (Metcalfe 1975). e.g. Bardi: [iŋ<u>u</u>m<u>u</u>ŋuridinɗina], [guŋ<u>i</u>r<u>i</u>miññdiɗ].

Our proposed constraints for this are simple:

(iii) Proposal

- COPY-LEFT: **E** precedes **E′**.
- COPY-RIGHT: **E′** precedes **E**.

With COPY-LEFT over COPY-RIGHT copying to the left prevails, and vice-versa.

(2)

/sensan/	COPY-LEFT	COPY-RIGHT
☞ sen<u>e</u>$_1$sa$_1$n		x
sen<u>a</u>$_1$sa$_1$n	x!	

- Note: We can't use the standard ANCHOR/ALIGN constraints (M&P 1993, 1995) since the left/right edge of a segment is the segment itself. Hence, [CaC<u>a</u>Ci] and [CaC<u>i</u>Ci] both satisfy ANCHOR-LEFT and ANCHOR-RIGHT equally well.

The point is fairly trivial.

Dynamic Direction: *"Copy L/R except when"*

Our aim, though, is to look at cases where the normal direction of copying is blocked. There are three main reasons, listed under (31), for this:

- The most common reasons for not copying in a certain direction:
  - (1) there is nothing in that direction to copy.
  - (2) The copied element must be root material (Wolof, Winnebago) [parallels in reduplication – Lushootseed (Urbanczyk 1996), Maori (Keegan 1996).]
  - (3) there is something better (i.e. less marked or more faithful) in the other direction.

These are the 'except when' clauses. We'll get to how to deal with them formally in due course. The thing we're interested in, though, is the *responses* to blocked situations. The question is, can the constraints I mentioned above account for these responses.

- What are the responses to this situation? Can the constraints acount for these responses?

4.2.1 Responses

(i) Reverse Direction

One of the most obvious moves to make is to reverse direction.

For example, in

- Hawaiian: Copies to the left, but copies to the right initially (Kitto 1997):

Can see that there is left copy in medial loanword epenthesis.

(i) Medial:		(ii) Initial:	
[kalikimaka]	'Christmas'	[pelena]	'bread'
[ʔenekinia]	'engineer'	[pelekikena]	'president'
[malaki]	'March'	[palani]	'brandy'
[kokoleka]	'chocolate'	[koloka]	'cloak'
		[puluma]	'plum'

- Also in Tamil (Wiltshire 1998): Epenthetic Cs copy from the left medially, but from the right initially.

This is a very simple cases of COPY-RIGHT emerging. In this case, there isn't really a *constraint* that blocks copying to the left, but a simple fact about candidates: you can't correspond to something to your left if there isn't anything there.

This is a TETU situation of ||COPY-LEFT » COPY-RIGHT|| where COPY-RIGHT emerges. There is no need for a triggering constraint since GEN cannot produce a candidate with a base to its left if there is nothing there to copy (we assume only vowels can be copied here – see below for formal implementation).

So, in the schema below -- the 'do *x,* except when *y* then do *z*' ranking || *y* » *x* » *z*|| -- *y* is not represented since it is a result of GEN.

Copy L/R else copy in opposite direction:
|| BE-CORR » COPY-*dir1* » COPY-*dir2* ||

(ii) Default to Unmarked

A more surprising result is found in a number of languages: if there is nothing to be copied in the normal direction, a *default* segment is epenthesized.

For example, in Wolof epenthetic vowels copy *root* segments to their left. When there are no available root segments though, the epenthetic element is a schwa.

- Wolof: Copies to the left. e.g. /xarf/ → [xaraf] 'to be initiated'
- When it can't (when the thing to be copied is not a root), it defaults to [ə].:

  e.g. /nap {Af} + kat {Root}/ → [na$_1$pəkat], *[napakat]

  To express this in terms of constraints, we need to consider the constraint BE-CORR. This requires epenthetic elements to correspond to something. So, if an epenthetic element *doesn't* correspond to something, what happens to it? For a start, no faithfulness constraints are relevant since it isn't in correspondence. This means that the only relevant constraints are markedness. Hence, non-corresponding elements end up with an unmarked value. As outlined in (32), this reasoning leads us to the conclusion that Wolof is a case of "Correspond, except when there is no root segment to the left, in which case do not correspond to anything", so ensuring default value.

(3) Analysis:

- So far, it has been assumed that every **E** corresponds to something else.
- This is not a necessity, and is expressed by

  BE-CORR "**E** must correspond to something."

  (i) This constraints has affinities with BR-DEP (M&P 1995), which requires every element in a reduplicant to have a correspondent.

  - If **E** does not correspond to anything, no faithfulness constraints can affect its quality.

  Therefore, its quality must be determined by markedness constraints.

  Therefore it defaults to the unmarked.

  - So, the present situation can be explained as a case of "Copy L/R, else do not correspond (i.e. default to unmarked quality)."

As Catherine showed, we simply need to translate this prose into the 'Do *x* except when *y* do *z*" constraint schema to achieve the result shown in tableau (33).

Plugging this into the "Do *x,* except when *y* do *z*" schema:

- "Correspond to something (BE-CORR), except when this would entail not copying a root element to the left (COPY-ROOT, COPY-LEFT), then do not correspond, and default to the unmarked."

(4)

/nap+kat/	COPY-ROOT	COPY-LEFT	BE-CORR	M(V→ə)
☞ a) napə̲kat			x	
b) napa̲$_1$ka$_1$t		x!		x
c) na$_1$pa̲$_1$kat	x!			x
/sarx/	COPY-ROOT	COPY-LEFT	BE-CORR	M(V→ə)
☞ a) sa$_1$ra̲$_1$x				x
b) sarə̲x			x!	

BE-CORR ensures correspondence, but is crucially blocked by COPY-ROOT and COPY-LEFT which require copying of a root element to the left. This blocking allows the markedness constraint V→ə to emerge, as shown in the first example.

Copy L/R else default segment:
|| *TRIGGER »* COPY-L/R » BE-DEP ||

- Similar case in Winnebago: copies root material to the right. At a suffix boundary the epenthetic vowel defaults to [ə].

(iii) Don't Epenthesize ||COPY-L/R » TRIGGER||

A more drastic response to failing to copy is simply not to epenthesize at all. There are quite a few cases like this. For example, in Karo Batak, consonants epenthesize under the pressure of ONSET. They copy the vowel to their left. However, initially there is no epenthesis at all.

- *Don't Epenthesize unless copying to the left/right is possible:*
  e.g. many cases of C epenthesis 'under hiatus', but not initially (e.g. Karo Batak – Woolams 1996): e.g. /tue/ → [tuwe], /ute/ → [ute], *[wute]
- This is a case of "Epenthesize (*trigger*), except when the epenthetic element cannot copy to the left (BE-CORR and COPY-LEFT), in which case do not epenthesize."
  (i) COPY-LEFT and BE-CORR require an epenthetic element to correspond to something and correspond to the left.
  (ii) ONSET is the trigger.
  (iii) Therefore, ||COPY-LEFT, BE-CORR » ONSET||

The implementation is, as always, straightforward, and shown in the tableau. Here the *trigger* of epenthesis is crucially dominated by constraints requiring leftward copying. Since there can be no candidate with a Base to the left of the epenthetic segment, it is best just to give up entirely, violating the trigger and so no epenthesizing.

(5) ||COPY-LEFT, BE-CORR » *trigger* ||

1.	/uta/	COPY-LEFT	BE-CORR	ONSET
	$\underline{w}_1u_1ta$	x!		
☞	uta			x
	$\underline{ʔ}uta$		x!	
2.	/ua/	COPY-LEFT	BE-CORR	ONSET
☞	$u_1\underline{w}_1a$			
	ua			x!
	$u\underline{ʔ}a$		x!	

Another related case in Dutch is mentioned on the handout, under (35).

(6) More striking are cases where (near-)complete identity between 𝔼 and and its correspondent 𝔼' are required:

e.g. In many languages (e.g. Dutch):

∅ → j / i_V
→ w / u_V
→ ∅ elsewhere

The analysis: "Epenthesize (*trigger*), except when the epenthetic element is not a (near-) perfect copy (BE-IDENT and BE-CORR), then do not epenthesize."

(7) ||IDENT, CORR » *trigger* ||

1.	/ua/	BE-IDENT	BE-CORR	ONSET
☞	$u_1\underline{w}_1a$			
	ua			x!
	$u_1\underline{ʔ}_1a$	x!		
	$u\underline{ʔ}a$		x!	
2.	/oa/	BE-IDENT	BE-CORR	ONSET
☞	$o_1\underline{w}_1a$	x!		
	oa			x
	$o\underline{ʔ}a$		x!	

Copy L/R else do not epenthesize:
COPY-L/R, DEP » TRIGGER

Before moving on to another aspect of this analysis, I will make an aside here: this analysis has an advantage in that it eliminates the need for more complex triggering constraints. In cases like this, anti-hiatus constraints like *VV have been proposed. The present analysis shows that less complex constraints like ONSET can be employed, with the contextual effects due to the correspondence constraints.

- *An advantage of this analysis*:
  Cases like this have usually been explained by invoking a context-sensitive triggering constraint. e.g. 'anti-hiatus' constraints like *VV, or the use of constraints like IO-ANCHOR-Left. Note that the Dutch case would require separate constraints like *{i,u}V *vs* *{~i,~u}V.

  This analysis shows that such constraints are unnecessary – they can be eliminated in favour of less complex constraints like ONSET and NOCODA once the relationship between other elements are better understood.

- Vowel example: e.g. Damascene Arabic: $CC]_{\sigma} \rightarrow CiC$, except word-finally:
  (8) ||COPY-RIGHT, DEP » *CC » M(V→i) » IDENT-F||

	/katabt/	0COPY-RIGHT	DEP	*CC]$_{\Sigma}$	M(V→i)	IDENT-F
	katabt$_i$i$_i$	x!				x
	katabta		x!		x	
☞	katabt			x		
	/atkba	1COPY-RIGHT	DEP	*CC]$_{\Sigma}$	M(V→i)	IDENT-F
☞	atki$_1$ba$_1$					x
	atka$_1$ba$_1$				x!	
	atkiba		x!			
	atkba			x!		

Even though the epenthetic vowel is default (i.e. not faithful) it still is in correspondence due to DEP.

In summary, the variety of responses to cases where normal direction is blocked can be accounted for by constraints on the correspondence of epenthetic elements to their bases.

4.2.2 "Except when …"

Moving on to section 4.2.2, the *z* part of the "Do *x* except when *y* then do *z*" has been accounted for in the previous section. The *y* part – the 'except when' clause – still remains to be talked about.

In the cases above, the "except when" clause basically took the form "except when there is nothing to correspond to." This condition was almost always a result of the inevitable fact that something can't correspond to something that isn't there. In other words, constraints had nothing to do with it – the condition was a result of

GEN. There are cases where constraints play a crucial role in deciding direction, though. The first case is from Maori.

(i) Markedness Causes Direction Reversal (≈ Mirror Image Rules)

- ❑ As noted above, in Maori loanwords total harmony takes place, as shown in (38):

(9) e.g. hanawiti ‘sandwich’, ha:mene ‘summon’, ha:pa ‘harp’, ho:ro ‘hall’, wuru ‘wool’, hepetema ‘September’, ha:marara ‘umbrella’, kokoroihe ‘cockroach’.

- ❑ Medially, though, the direction of copy is variable:

Medially, though, the direction of copying varies, as you can see in (39) on your handout. This is illustrated with *i* vs a number of other vowels. The pattern here is not random, though. Simply speaking, if [i] is available, it is copied.

(10) Illustrated with “*i* vs V”

a_i: [a:tiri:kona]	‘archdeacon’
i_a: [piɾiniha]	‘prince’
i_e: [pihikete]	‘biscuit’
u_i: [hu:pirimi]	‘supreme’

- ❑ There is a pattern: if [i] is available, it is copied.

- ❑ To make sense of this, it pays to know that [i] is the least marked vowel in Maori (independent evidence from passive/ nominalisation allomorphy – Blevins 1994).

This gives us a way to explain this case:
It is a situation of “Copy to the left, except when there is something least marked in the other direction, in which case copy right.” In other words, *markedness* is driving direction.

- ❑ This can be explained as a case of markedness driving direction:
  “Copy left (COPY-LEFT), except when there is a less marked vowel to the right (M(V→i)), copy to the right (COPY-RIGHT).”

Translating this as usual into a constraint ranking we get tableau (40). The first example shows that it is best to copy an unmarked element than to copy to the left.

(11) Markedness-Driven Reversal: ||MARKEDNESS » DIRECTION||

1.	/pirinha/	BE-IDENT	M(V→i)	COPY-LEFT
☞	piri$_1$ni$_1$ha			x
	pirina$_1$ha$_1$		x!	
2.	/heptema/	BE-IDENT	M(V→i)	COPY-LEFT
☞	he$_1$pe$_1$tema		x	x
	he$_1$pi$_1$tema	x!		

☞ Similar situation in Oscan (Buck 1904, Anderson 1974) and West Greenlandic C-epenthesis (Cearley 1970).

Markedness-Driven Direction:
BE-FAITH » M » COPY-L/R

(ii) Faithfulness Causes Direction Reversal

The other set of constraints that can trigger direction reversal are faithfulness constraints. The relevant example here is Faroese. In this language, ONSET forces consonant epenthesis. The epenthetic consonant copies the features of an adjacent vowel, resulting in the palatal glide [j] or the labiovelar [w].

A relevant point here is that [j] is almost identical to [i], and [w] to [u]. In other words, they differ very minimally in faithfulness. [j] is not so much like other vowels, like [e] or [a], nor is [w] so like [o].

Where this becomes relevant is in terms of direction. Simply put, Faroese epenthetic consonants like to be fully faithful. Being fully faithful means copying either [i] or [u]. So, if there is an [i] or [u] available, it is copied, no matter where it is -- to the left or right. For example, an input with /ua/ will surface as [uwa], just as the input /au/ will surface as [awu]. In other words, direction is blatantly sacrificed in order to get a more faithful copy.

The crucial environment is [i_u] and [u_i]. Here, copying from the left takes place: [iju], [uwi].

In short, this system can be described as "Copy from the left, unless there is a more faithful copy elsewhere, then copy from the right." The constraint translation of this is shown in Tableau (41) with faithfulness crucially dominating the direction constraints.

☞ Faroese (Anderson 1974): Consonant epenthesis copies an adjacent /i/ or /u/.
(i) The [i,u] can precede or follow the glide.
(ii) In the context i_u or u_i, the glide copies the leftmost vowel.

Analysis:

- ❑ Glides are restricted to [j] or [w].
- ❑ [j] and [w] are identical (except for a mora) to [i] and [u], resp.
  - ❑ So, copying [i] or [u] will incur less faithfulness violations than copying, e.g. [e], [o], or [a].

"Copy left (COPY-LEFT), except when a more faithful copy is available (IDENT-F) to the right (COPY-RIGHT)."

(12) **Faithfulness Driven Reversal: ||IDENT-F » DIRECTION||**

	/oi/	BE-IDENT-F	COPY-LEFT	COPY-RIGHT
☞	oj$_1$i$_1$		x	
	o$_1$w$_1$i	x!		x
	/ui/	BE-IDENT-F	COPY-LEFT	COPY-RIGHT
☞	u$_1$wi			x
	uj$_1$i$_1$		x!	

4.3 Summary

To summarize, in section 4.3, the focus of this section has been on identifying the Base by means of constraints. As predicted by constraint violability and ranking permutation, a variety of strategies are available when the base cannot be in the preferred direction. These strategies can be accounted for by the constraints proposed. Also, as shown for Faroese and Maori, constraints can trigger direction reversal.

- ☞ The aim of this section was to introduce the 'dynamic' notion of Base of Epenthesis.
- ☞ The Base is the best possible segment that an element could correspond to.
  Why have the cases discussed above given evidence for the dynamic notion of Base? Well, consider the alternative: a static definition like "The Base is the next element to the left" is inadequate since direction reversal is allowed. The most precise definition one could give is that the Base for epenthesis is "a segment somewhere near the epenthetic element." The rest of the burden of actually determining which segment this is necessarily falls on constraints anyway. Our claim is that this burden can be placed *totally* on constraints. The need for a static definition of base is obviated when constraints will get the job done anyway. This point is supported by evidence to do with locality, which we won't have time to talk about.

6 Conclusions

To conclude then,

- ☞ We have introduced a theory of epenthesis that makes crucial use of a correspondence relation between the epenthetic element and other output segments.
- ☞ This expresses the idea that copy epenthesis is akin to reduplication.
- ☞ By using correspondence, the problem of line-crossing encountered in autosegmental theory is avoided.

Finally, the 'dynamic definition' of Base was introduced. Our claim is that the 'Base' is simply the best thing available, where 'best' is determined by constraints. There is no need to invoke independent identification mechanisms.

Thank you.

Typology:

- ❑ Permuting constraints – both markedness and faithfulness – produces a variety of attested types of epenthetic processes and responses to epenthesis; these range from totally faithful copy through partial copy to default segmentism.
- ❑ The constraints also account for cases of "Do *x* except when" situations in epenthesis.
- ❑ The Dynamic Definition of Base was introduced. It was shown how various permutations of constraints produced a typology of different Epenthetic Element—Base pairings.
- ❑ The constraints not only account for epenthetic quality, but for the triggers and repairs attested in epenthetic processes.