I. Introduction

There are certain problems with the PARSE/FILL theory of faithfulness. Those problems become particularly serious when we attempt to deal with segmental rather than prosodic phonology. So now it’s appropriate to replace the PARSE/FILL theory with an alternative model, that lends itself to consideration of a wider range of types of unfaithfulness and constraints on faithfulness. This approach, Correspondence Theory, is developed in McCarthy & Prince 1995, 1999.

II. The Correspondence Relation

Gen takes an input and emits a set of ordered triples each of which consists of the input string, a candidate output string, and a relation between the segments of the input string and the segments of the output string:

\[
\text{Gen}(\text{/cat/}) \rightarrow \{(\text{/cat/}, [\text{cat}], R_1), (\text{/cat/}, [\text{ca}], R_2), (\text{/cat/}, [\text{cat}], R_3), (\text{/cat/}, [\text{dog}], R_4), \ldots\}
\]

The relation \(R\) that is specific to each (I,O) pair expresses the range of differences and similarities between them. Thus, faithfulness constraints are going to refer to this relation, rather than (as in the FILL/PARSE model) to some specific aspects of prosody/segment matching or mis-matching. You should probably think about each \(R_n\) as a function from the input, which is common to all candidates, to a specific output candidate. (Strictly speaking, \(R\) isn’t a function, because it can map one segment onto two or two segments onto one. That’s why we fussily call it a relation. But the properties of \(R\) in normal faithful situations are exactly what we expect of well-behaved functions.) We don’t usually bother to define the properties of each \(R_n\) in detail; instead, we use indices to indicate those cases where the \(R\)-mapping isn’t just one-to-one:

\[
(1) \quad \text{Some Correspondence Relations: Input } = /p_1 a_2 u_3 k_4 t_5 a_6/
\]

\[\begin{align*}
(a) \quad p_1 a_2 u_3 k_4 t_5 a_6 & \quad \text{A fully faithful analysis — perfect I-O correspondence.} \\
(b) \quad p_1 a_2 \hat{u}_3 k_4 t_5 a_6 & \quad \text{Hiatus prohibited (by high-ranking ONSET), leading to epenthesis. Epenthetic } \hat{u} \text{ in O has no correspondent in I.} \\
(c) \quad p_1 \hat{u}_3 k_4 t_5 a_6 & \quad \text{Hiatus prohibited, leading to V-deletion. The deleted segment } a \text{ in I has no correspondent in O.} \\
(d) \quad p_1 a_2 u_3 t_4 t_5 a_6 & \quad \text{The } k_4 \text{ in I has a non-identical correspondent in O, for phonological reasons (CODA-COND, for example).} \\
(e) \quad b \hat{l} u \hat{r} k & \quad \text{No element of O stands in correspondence with any element in I. Typically fatal, and not worth dwelling on.}
\end{align*}\]

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Some Questions:

- What happens to the assumptions about Gen and output prosodic structure that were important in the PARSE/FILL theory? They are no longer important. We now understand deletion as literal deletion (not non-parsing/syllabification) and epenthesis as literal epenthesis (not just an empty syllabic node). Conceivably, you might find reasons to reintroduce the former assumptions as an overlay on Correspondence Theory, but as yet there’s no compelling reason to do so.

- Is some specific ℜ really part of the characterization of a particular candidate? Yes! For instance, from input /c₁a₂t₃/ there are two distinct but homophonous candidates: [c₁a₂t₃], which is fully faithful, and [c₁a₂t], in which /t/ has been deleted and replaced by epenthetic [t]. This kind of structural ambiguity is commonplace in linguistics, and should not be troubling. Nor should it be a matter of particular concern that no ranking of the constraints of UG will ever favor [c₁a₂t] as optimal. That’s what the constraints are supposed to do: lead to sensible results and theorems about which of the many Gen-supplied candidates actually has a prayer of being optimal.

- Where do the candidates come from? Well, you could think of the candidates as themselves being universal, so what Gen really does is to supply various ℜ’s. Every output is matched with every input by some ℜ — usually a rotten match that goes nowhere once the constraints are considered. This, then, is a kind of macrocosm of the argument made in PARSE/FILL terms that Gen can emit candidates with very long strings of epenthetic segments, but FILL rejects them and no constraint favors them.

- (You might want to read this after reading section IV below.) Above, ℜ is described as a relation from segment to segment. What about structure above the level of the segments (moras, syllables, feet)? If such structure is underlyingly present — and we have various reasons to think it is (such as contrasts between long and short vowels in Arabic or lexically contrastive stress in Russian) — then constraints will be required to ensure that this structure is faithfully reproduced at the surface.

  Two possible approaches:
  1. Simpler: do it all through segments.
  2. More elaborated: extend ℜ to apply to prosodic as well as segmental structure.

  The first approach predicts that prosodic structure is maintained faithfully only when the segments that bear it are preserved. The second approach sees prosodic structure as independent of the segments that bear it, as indeed it appears to be in phenomena like compensatory lengthening, in which a mora reassociates in response to deletion of the segment that originally held it.

- What about features? See section IV below.
III. Some Faithfulness Constraints under Correspondence Theory

Formerly, we saw the anti-deletion and anti-epenthesis faithfulness constraints \textsc{Parse} and \textsc{Fill} formulated solely in terms of prosody/segmentism mismatches that are directly visible in the output. Now those constraints are interpreted in a different way: they militate against the \( \Re \) relation being \textit{incomplete} in the input-output (I\( \rightarrow \)O) or output-input (O\( \rightarrow \)I) direction. The usual way of describing these situations in terms of functions is to use the notions “domain” and “range”, defined as follows:

For a relation \( \Re \subset A \times B \),
\[
x \in \text{Domain}(\Re) \Leftrightarrow x \in A \text{ and } \exists y \in B \text{ such that } x \Re y;
\]
\[
y \in \text{Range}(\Re) \Leftrightarrow y \in B \text{ and } \exists x \in A \text{ such that } x \Re y.
\]

That is, the Domain is the set of things in the Input that \( \Re \) applies to, and the Range is the set of things in the Output that \( \Re \) maps on to.

Then the constraints replacing \textsc{Parse} and \textsc{Fill}, respectively, are these:

1. \textbf{M}AX (anti-deletion; replaces \textsc{Parse})
   Every element of the Input has a correspondent in the Output candidate.
   \[\text{Domain}(\Re) = \text{Input}.\]

2. \textbf{D}EP (anti-epenthesis; replaces \textsc{Fill})
   Every element of the Output candidate has a correspondent in the Input.
   \[\text{Range}(\Re) = \text{Output candidate}.\]

\textsc{Max} and \textsc{Dep} don’t require anything else beyond what they specifically say. In particular, they don’t demand that the correspondents \textit{be identical}, nor that they \textit{be in the same linear order}, nor that they \textit{maintain the individuality of correspondent segments}. \textsc{Max} and \textsc{Dep} look at segments in isolation, but some other constraints look at segments in terms of their place in the Input or Output string. Most of these constraints have no analogue in the \textsc{Parse/Fill} theory, though we have noted the need for some of them:

3. \textbf{LINEARITY} — “No Metathesis”\footnote{Think about this: why does this definition include the condition “if \( x \Re x' \) and \( y \Re y' \)”?}

The Input is consistent with the precedence structure of the Output, and vice versa.

Let \( x, y \in S_1 \) and \( x', y' \in S_2 \).

If \( x \Re x' \) and \( y \Re y' \), then
\[x < y \text{ iff } (y' < x').\]

(“\(<\)” = “precedes, string-wise”)

Lithuanian conjugation supplies an example of stop/fricative metathesis. Roots that underlyingly end in coronal-fricative+velar-stop change to velar-stop+coronal-fricative when the following suffix begins with a consonant:

<table>
<thead>
<tr>
<th>( X )</th>
<th>‘he/she ( X )es’</th>
<th>‘he/she ( X )ed’</th>
<th>‘to ( X )’</th>
<th>‘( X, \ y’all!’</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘tear’</td>
<td>dreːsk⁵ːa</td>
<td>dreːskːe</td>
<td>dreːksti</td>
<td>dreːkskite</td>
</tr>
<tr>
<td>‘knit’</td>
<td>meːzga</td>
<td>meːzge</td>
<td>meːgsti</td>
<td>meːgskite</td>
</tr>
<tr>
<td>‘toss’</td>
<td>blɔː:jk⁵ːa</td>
<td>blɔː:jke</td>
<td>blɔː:kjti</td>
<td>blɔː:kjkte</td>
</tr>
</tbody>
</table>

Focusing only on the metathesis process, see whether you can construct an OT analysis.
(4) Contiguity
   a. I-CONTIG (“No Skipping”)
      The portion of the Input standing in correspondence forms a contiguous string.
      Domain(ℜ) is a single contiguous string in the Input.
   b. O-CONTIG (“No Intrusion”)
      The portion of the Output standing in correspondence forms a contiguous string.
      Range(ℜ) is a single contiguous string in the Output.

These constraints characterize two types of contiguity requirements:

The constraint I-CONTIG rules out deletion of elements internal to the input string. Thus, the map
xyz → xz violates I-CONTIG, because the Range of ℜ is {x,z}, and x,z is not a contiguous string in
the input. But the map xyz → xy does not violate I-CONTIG, because x,y is a contiguous string in
the input. A specific case of this has been met with in this class — recall that only peripheral
segments are deleted in Tibetan numerals. The constraint O-CONTIG rules out internal epenthesis:
the map xz → xyz violates O-CONTIG, but the map xy → xyz does not.

Two constraints rule out types of multiple correspondence — coalescence, where two elements
of the Input are fused in the Output, and diphthongization (breaking) or phonological copying,
where one element of the Input is split or cloned in the Output.

(5) UNIFORMITY — “No Coalescence”
   No element of the Output has more than one correspondent in the Input.
   For x,y ∈ Input and z ∈ Output, if xℜz and yℜz, then x=y.

(6) INTEGRITY — “No Breaking”
   No element of the Input has multiple correspondents in the Output.
   For x ∈ Input and w,z ∈ Output, if xℜw and xℜz, then w=z.

Certain types of alignment constraints can also be understood in terms of Correspondence The-
ory. Specifically, alignment constraints that have the effect of banning peripheral deletion or
epenthesis, can be seen in terms of a special demand for correspondence at edges. The term that
has been proposed for such constraints is ANCHORING:

(7) {RIGHT, LEFT}-ANCHOR
   Any element at the right/left edge of the Input has a correspondent at the right/left edge (re-
spectively) of the Output.
   Let Edge(X, {L, R}) = the element standing at the Edge = L,R of X.
   RIGHT-ANCHOR. If x=Edge(Input, ℜ) and y=Edge(Output, R) then xℜy.
   LEFT-ANCHOR. Likewise, mutatis mutandis.

E.g., Axininca Campa prohibits initial deletion or epenthesis even when presented with an initial
onsetless syllable; so, LEFT-ANCHOR >> ONSET (McCarthy & Prince 1993).

IV. Featural Faithfulness

Thus far, we’ve only looked at segments and their relations to other segments. What about fea-
tures? There are at least two possible approaches:

Features As Attributes/Properties

The conceptually simpler approach sees segments as the elements standing in correspondence,
with features as attributes of segments. Then, for every feature (or class of features, like Place)
there is a constraint of the following form:
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(8) \textit{IDENT(±feat)}

Correspondent segments have identical values for the feature [±feat].

If \( x \equiv y \) and \( x \) is [\( γ \text{feat} \)], then \( y \) is [\( γ \text{feat} \)].

A slightly more complex approach, along the same general lines, would have distinct (and therefore differently rankable) constraints \textit{IDENT(+feat)} and \textit{IDENT(–feat)}. Either way, segments are the locus of the correspondence relation, and any aspect of faithfulness to features must be mediated by the segments that bear them. Though the basic approach is very different, the view of features adopted here is not unlike that in \textit{SPE}, which also sees features as attributes of segments, which are the real entities.

\textit{Features As Entities/Objects}

A conceptually more complex approach gives to features the same status as segments have, correspondence-wise. Then, for every feature (and/or perhaps for every class of features, like Place or Laryngeal) there are constraints of the following form:

(9) \textit{MAX(feat)}

A feature [\( feat \)] present in the Input must have a correspondent in the Output.

(10) \textit{Dp(feat)}

A feature [\( feat \)] present in the Output must have a correspondent in the Input.

With constraints like these, features can be faithfully preserved independently of the segments that bear them. This is relevant in two obvious situations (and some less obvious ones we may get to talk about later):

- If a segment deletes, some of its features can stick around. Thus, \textit{MAX} (i.e., \textit{MAX(seg)}) is violated, but some \textit{MAX(feat)} constraints are obeyed. Possible example: French /bon/ → [b\( ɔ \bar{\text{i}} \)].

- Features with no underlying segmental sponsors. These are called “Floating Features” — see Cheryl Zoll’s dissertation for a review of such cases.

To many it seems pretty obvious that \textit{tone} must be given independence of segments, but it’s less obvious that non-tonal features require this.

It’s worth noting that \textit{MAX(feat)} and \textit{Dp(feat)} are not sufficient as a theory of featural faithfulness, if features stand in correspondence. The reason: we need additional constraints to ensure that features don’t \textit{freely} move around to other segments. Otherwise, the constraint responsible for final devoicing (violating \textit{MAX(voice)}) in German would just induce \textit{movement} of [\( \text{voice} \)] to some non-final segment: /tag/ → *[dak]! That’s why this approach is more complex conceptually and implementationally.

\[\footnote{Note that the \textit{IDENT(feat)} theory may be able to treat this case as a type of coalescence: /bɔ\text{2n}/ → [b\( ɔ\text{2}.\text{3} \)].}\]