FUSION AND ALIGNMENT:
THE CASE OF MALAY

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1 Issues
1.1 The Original Problem
The facts of prefixation in Malay, in the case of nasal-final prefixes (e.g. ‘meN-’
(transitive)), follow in (1). (Roots are underlined.)

e. məN + garam    [mɔŋŋgaram] (‘menggaram’)  ‘salt’, v.t.
f. məN + dəsu    [mɔndəsu]  ‘resound’, v.i.

Rule-ordering analyses of this data would claim that that nasal substitution in Malay
involves the prefix-final nasal (N) assimilating to the place of articulation of the first sound
of the following root (Rule 1), followed by deletion of that onset obstruent in the case of
voiceless-obstruent-initial roots (e.g. /p/, /t/, /k/) (Rule 2). Thus, for instance, [mɔnmukol]
(‘mempukul’, hit, v.t) is correct, but *[məmpukol] is ungrammatical.

1.2 OT and the Problem
Such an analysis of the facts raises the following concern. Assimilation and deletion are
two separate and unrelated processes, and there is no lack of cross-linguistic data to
demonstrate this fact. Stipulating that the Malay data represents the product of a two-step
process is not explanatorily adequate because it fails to explain why the processes occur
together.

Optimality Theory avoids such stipulation, since it does not support a processual
analysis of the data. In Optimality Theory, possible pronunciations (output candidates) of a
word (input) are evaluated simultaneously against a set of ranked constraints. The
pronunciation that incurs the fewest violations of the constraints is selected as the ‘optimal’
one (See Appendix A for the fundamental tenets of Optimality Theory). A recent
Optimality theoretic treatment (Pater 1996) involves claiming that ‘fusion’ is a more
desirable account of the above prefixation facts. A fusion version of məN₁ + p₂ukol
follows in (2), where a two-to-one mapping is seen to hold between the two input
segments, N₁p₂, and the single output segment, m₁₂.

1 I am grateful to Keith Fernandes, Adamantios Gafos, Fran Gulinella, Harry van der Hulst,
Young-Kook Kwon, and Nancy Ritter for their feedback and kind support, although I hasten to
add that the material in this paper may not necessarily reflect their views.

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2. \[
\text{input } m \, \alpha N_1 + p_2 \, u \, k \, o \, l \\
\text{output } m \, \alpha m_{1,2} \, u \, k \, o \, l
\]

Pater’s one-step analysis is meant to eliminate the explanatory gap inherent in two-step analyses of the Malay facts. Pater sees fusion as one of many ‘repair’ strategies adopted by various languages to avoid the sequence Nasal + Voiceless Obstruent (henceforth, ‘NT’).\(^2\) He cites the faithfulness constraint LINEARTY (McCarthy and Prince 1995), which stipulates that S1 reflect the precedence structure of S2, and vice versa, where S1 is the input and S2 the output. (See Appendix B for full statement of all constraints employed in this paper). Bearing this in mind, consider once again the facts of ‘fusion’, depicted in (3). (The segment resulting from fusion has two indices associated with it.)

3. \[
\text{m} \alpha N_1 + p_2 \text{ileh (input)} \\
i / \\
m \alpha m_{1,2} \text{ ileh (output)} \text{ (Pater 1995:6)}
\]

As explained by Pater, N\(_1\) precedes p\(_2\) in the input, but not so in the output. This means that the output violates LINEARTY. The ranking that Pater thus proposes is responsible for the output selected is stated in (4).

4. \( ^* \text{NT} > \text{LIN} \) (where \( \text{LIN} = \text{LINEARTY} \))

The tableau in (5) derives from Pater 1996, and shows the result of this ranking. (‘✓’ denotes the optimal candidate.) The candidate in (5b), in which no fusion has occurred, violates \( ^* \text{NT} \) and is eliminated. Fusion, in (5a), violates LINEARTY but obeys the more high-ranked \( ^* \text{NT} \), and is therefore the preferred option.

5. **Fusion: \( ^* \text{NT} >> \text{LIN} \) (Pater 1996:9, #7)\(^3\)**

<table>
<thead>
<tr>
<th>Input: ( m \alpha N_1 + p_2 \text{ileh} )</th>
<th>( ^* \text{NT} )</th>
<th>( \text{LIN} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. ( m \alpha m_{1,2} \text{ ileh} \ ✓ )</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>b. ( m \alpha m_{1,2} \text{ ileh} \ ) !</td>
<td>✓ !</td>
<td>✓ !</td>
</tr>
</tbody>
</table>

Root-internal data in Malay does not, however, seem to involve fusion. (See Appendix C.c) Pater accounts for this fact by claiming that it is more undesirable to allow fusion root internally than it is to permit the undesirable sequence, but that the constraint against the sequence, \( ^* \text{NT} \), is a more powerful constraint than a constraint (LINEARTY-ROOT) that militates against non-root-internal fusion. Thus the constraints responsible for

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\(^2\) Pater finds that other attested strategies are nasalization of the obstruent, denasalization of the nasal, and deletion of the nasal.

\(^3\) For typological simplicity, I have chosen to use neither Pater’s 1996 \( ^* \text{N} \) constraint nor his 1995 version, \( ^* \text{NC} \) but \( ^* \text{NT} \). The check denotes the optimal candidate
selection of the optimal candidate in this analysis include both a root-specific and non-root-specific version of a constraint against fusion. The root-specific constraint outranks *NT, which in turn outranks the general Linearity constraint. The relevant ranking is expressed in (6). The tableau in (7) illustrates the selection made. Candidate (7a) fails to get selected because the high-ranked root-specific Linearity is violated since fusion has occurred within a root. The non-fusion candidate, (7b), which violates the lower-ranked *NT, is selected instead.

6. **Linearity-Root >> *NT >> Linearity**

7. **Root-internal NT tolerance: LinRoot >> *NT >> Lin**

<table>
<thead>
<tr>
<th>Input: əm₁p₂ət</th>
<th>LinRoot</th>
<th>*NT</th>
<th>Lin</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. əm₁₂ət</td>
<td>* !</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>b. əm₁p₂ət</td>
<td></td>
<td>*</td>
<td></td>
</tr>
</tbody>
</table>

(Pater 1996:10, #8 and Pater 1995:8)

1.3 Further Complications

Pater writes, ‘Clearly a lot of work needs to be done to determine the empirical coverage of root-specific Linearity constraints’ (Pater 1995) — and it does. There is further data in Malay that fails to be accounted for by this analysis. Specifically, the boundaries a) between prefixes, b) between suffixes, c) between reduplicants, and d) between roots and suffixes do not pattern along the dichotomy Pater suggests. (See Appendix C for data in question.) Thus, for instance, fusion does not occur between prefixes, but there is nasal place assimilation, as shown in (8). (Again, italics denote the result of fusion.)

8. **mɑN + pər + ʃambah (+kan)**
   **mampərɔsambahkan, (*mɔŋɛrsɔmbahkan)**

   \| lab
   ‘present (verb)’+ performative

These facts mirror the root-internal facts of the language. In the environments (b-d) (above), neither fusion nor place assimilation is in evidence. Taken together with the prefix-root boundary, which is the only spot where fusion does seem to occur, these facts indicate the need for some new explanation.

2 Analysis

2.1 A New Dichotomy

I maintain that parameterizing a fusion constraint according to environment would fail to capture the generalization underlying all the environments, and would be theoretically uneconomical. I suggest instead that there is a dichotomy between sequences of segments that are homogenous with respect to morphological category-type (e.g. root-internal, prefix-prefix, suffix-suffix, reduplicant-reduplicant) and those that are heterogenous with respect to morphological category type (e.g. prefix-root, root-suffix). Fusion is blocked in the former type of sequences, but may be permitted in the latter. I take my cue from
McCarthy and Prince (1995), extending their UNIFORMITY constraint against coalescence (fusion) by specifying the domain of its application as in (9b).

9. a. **UNIFORMITY** (M&P 19995): S2 may not have multiple correspondents in S1.
   b. **UNIF-HMG**: S2 may not have multiple correspondents in S1, where S1 an environment that is homogenous with respect to morphological category-type

   The ranking of constraints that I propose follows in (10).

10. **UNIF-HMG >> *NT**

   I omit irrelevant candidates (e.g. post-nasal voicing, epenthesis, etc.) in (11), which illustrates the result of the ranking in (10).

11. **Prefix-prefix juncture: No fusion**

<table>
<thead>
<tr>
<th>Input: maN₁ + p₂ə + (buwat)</th>
<th>UNIF-HMG</th>
<th>*NT</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. mam₁p₂ə... ✓</td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>b. mam₁₂ə...</td>
<td></td>
<td>*!</td>
</tr>
</tbody>
</table>

The fusion candidate, in (11b), violates UNIF-HMG and is eliminated. The selected non-fusion candidate, in (11a), honors this constraint although it violates the low-ranked *NT. All other environments are tested in (12), using the same constraint ranking as in (11). The ranking selects grammatical outputs in all three cases. Root-internally (in (12a)) and between suffixes (in (12c)), fusion is blocked because it would involves violating the high-ranked UNIF-HMG. The opposite holds in the heterogenous environment that obtains at the prefix-root juncture, fusion selected over an *NT violation.

12. a. **Root-internally: No fusion**

<table>
<thead>
<tr>
<th>Input: tóm₁p₂ət</th>
<th>UNIF-HMG</th>
<th>*NT</th>
</tr>
</thead>
<tbody>
<tr>
<td>i. tóm₁p₂ət ✓</td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>ii. tóm₁₂ət</td>
<td></td>
<td>*!</td>
</tr>
</tbody>
</table>

b. **Prefix-root juncture: Fusion**

<table>
<thead>
<tr>
<th>Input: maN₁ + p-ileh</th>
<th>UNIF-HMG</th>
<th>*NT</th>
</tr>
</thead>
<tbody>
<tr>
<td>i. mam₁₂ileh ✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ii. mam₁p₂ileh</td>
<td></td>
<td>*!</td>
</tr>
</tbody>
</table>

c. **Suffix-suffix juncture: No fusion**

<table>
<thead>
<tr>
<th>Input: ..+kan₁+ k₂ah</th>
<th>UNIF-HMG</th>
<th>*NT</th>
</tr>
</thead>
<tbody>
<tr>
<td>kan₁k₂ah ✓</td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>kaŋ₂₃ah</td>
<td></td>
<td>*!</td>
</tr>
</tbody>
</table>