A. MORPHOPHONEMIC CHANGE IN CROW AND HIDATSA

For the protolanguage of Crow and Hidatsa (1), the following three phonetic rules, from among others, are reconstructed. The phonetic rules of a language are ordered rules that indicate how sequences of phonemic, morphophonemic, and junctural symbols are phonetically interpreted (2).

P1. \[
\begin{cases}
  e \\ o \\ a \\
\end{cases} \rightarrow a
\]

This rule states that if a nondiffuse vowel — that is, e, o or a — is immediately followed by the vowel, short a, the nondiffuse vowel becomes a and the original a is lost. By this rule forms like hathaaci, kunveaci, and pheaci become hathaci, kunvaci, and phaci.

P2. \[\hat{V}_1 \rightarrow \hat{V}_1 ? V_1\]

This rule states that the morphophoneme \(\hat{V}\) is replaced by a vowel that is accented, short, and in all other respects just like the vowel that follows it; and a glottal stop is placed between these two vowels. By this rule forms like kvuaci, kunvaci, and uv\(\hat{a}\) become ku\(\hat{a}\)uaci, kun\(\hat{a}\)?aci, and u\(\hat{a}\)\(\hat{a}\).

P3. \[ua \rightarrow u\]

If a short a immediately follows the vowel u, the a becomes u and the original u is lost. By this rule forms like ku\(\hat{a}\)uaci, and u\(\hat{a}\)\(\hat{a}\)aci become ku\(\hat{a}\)uci and u\(\hat{a}\)\(\hat{a}\)aci.

Observe the following protolanguage forms that are made up of the verb stems hatha (break), kvu (give), kunve (carry), phe (eat), pvo (blow), and uv\(\hat{a}\) (climb), the noun stem pvoki (feather), and the suffixes aci, which indicates that the action is like that denoted by the preceding verb stem, and i, which indicates that the action denoted by the preceding verb stem is done repeatedly. These forms are arranged in three pairs of columns; the form of the first of each pair is in the phonemic representation — that is, the form that it has before the application of the phonetic rules — and the form of the second of each pair is its form after the application of the three phonetic rules P1, P2, and P3.
The forms that occur in Hidatsa can best be explained by postulating two innovations that are applied to the grammar of the protolanguage. The first of these innovations consists of the addition of a morphophonemic rule to the grammar. Morphophonemic rules precede phonetic rules in the grammar of a language and thus have the effect of changing the phonemic representation of the forms of the language; that is, the representation to which the phonetic rules apply. This added morphophonemic rule is

PH1. \( o \rightarrow u \)

That is, morpheme-final \( o \) is replaced by \( u \). With the addition of PH1 to the grammar of the protolanguage, a restructuring takes place; that is, the grammar of the protolanguage plus the morphophonemic rule PH1 is replaced by an equivalent, but formally simpler, grammar: Equivalent in that the same sentences are generated, and simpler in that there are fewer rules. This new grammar is the same as the grammar of the protolanguage in all respects except that each morpheme in the grammar that ends with an \( o \) is replaced by another that is just like it except that it ends in \( u \). For example, the verb stem \( p^v\circ \) is replaced by a verb stem \( p^v\u203e \). Thus, the sentences of the language do not have the forms of the stem \( p^v\circ \), instead they have the forms

\[
p^v\u203e \quad p^v\u203e\u203c \quad p^v\u203e\u203i
\]

The phonetic rules P1, P2, and P3 have come into Hidatsa without any changes; but through the action of the added morphophonemic rule PH1 and the resultant restructuring there are no longer any forms of \( p^v\circ \) for them to apply to, whereas there are the forms of \( p^v\u203e \). Thus, the new sequences produced by P1, P2, and P3 are

\[
p^{\u203f}u \quad p^{\u203f}uci \quad p^{\u203f}ui
\]

Note that although the protolanguage form \( p^{\u203f}aci \) becomes, in some sense, Hidatsa \( p^{\u203f}uci \), it is not true that the phonetic entities of the protolanguage form become individually those of the Hidatsa form; rather, the verb stem \( p^v\circ \) is replaced by the verb stem \( p^v\u203e \), and the rules of the grammar apply to \( p^v\u203e \) just as they do to any other verb stem of the language.

The second innovation that is applied to the grammar — that is, to the grammar that exists after the addition of PH1 and the resultant restructuring — is the addition of the
phonetic rule PH2, which follows all of the other phonetic rules of the language.

\[
\text{PH2. } V_1 V_2 \rightarrow V_1 ? V_2
\]

That is, a glottal stop is inserted between all sequences of two vowels. Since PH2 is a phonetic rule, it applies to the sequences of phonetic entities that result from the application of the other phonetic rules of the language. Thus, the phonetic rules of Hidatsa are those of the protolanguage plus PH2; and the results of the application of these phonetic rules are like those of the protolanguage in the first and second pairs of columns, and the third pair is now

<table>
<thead>
<tr>
<th>Hidatsa</th>
<th>Hidatsa?í</th>
</tr>
</thead>
<tbody>
<tr>
<td>kvuí</td>
<td>ku?uí</td>
</tr>
<tr>
<td>kunvëi</td>
<td>kuné?e?í</td>
</tr>
<tr>
<td>phëi</td>
<td>phë?í</td>
</tr>
<tr>
<td>pvuí</td>
<td>pú?uí</td>
</tr>
<tr>
<td>uväi</td>
<td>ú?á?í</td>
</tr>
</tbody>
</table>

No restructuring takes place after the addition of PH2, for there is no equivalent but simpler grammar than that of the preceding grammar plus PH2.

The corresponding forms that occur in Crow are also explainable in terms of the grammar of the protolanguage plus several innovations. I shall discuss just one of these innovations – the addition of the morphophonemic rule PC1 after the other morphophonemic rules of the language and before the phonetic rules.

\[
\text{PC1. } +V_1 \rightarrow V_1^+\]

That is, the morphophoneme \( + \) is removed, and the vowel following it is accented and lengthened. With the addition of PC1 to the grammar, a restructuring takes place which consists of replacing each morpheme in the language that contains the sequence \( +V_1 \) with one that contains the vowel \( V_1^+ \) instead; and, since now the language no longer contains the morphophoneme \( + \), the phonetic rule P2 can be removed. Instead of forms of the stems kvu, kunve, pvo, uva, and pvoki, the language now contains forms of the stems kú, kuné, po, ua, and póki; and the phonetic rules P1 and P3, which have come into Crow without any changes, apply to these forms:

<table>
<thead>
<tr>
<th>Crow</th>
<th>Crow</th>
</tr>
</thead>
<tbody>
<tr>
<td>kuaci</td>
<td>kuaci</td>
</tr>
<tr>
<td>kunaci</td>
<td>kunaci</td>
</tr>
<tr>
<td>paci</td>
<td>paci</td>
</tr>
<tr>
<td>uaci</td>
<td>uaci</td>
</tr>
<tr>
<td>uái</td>
<td>uái</td>
</tr>
</tbody>
</table>
We have seen that by postulating innovations that are additions of morphophonemic rules to the grammar of the protolanguage — that is, changes that take place on the phonemic rather than on the phonetic level of the sentences of the language — we have been able to explain some of the sound correspondences of Crow and Hidatsa. In particular, we have explained why only three vowels need be reconstructed to account for the six correspondences in the following pairs, in which the first member of each pair is the Hidatsa form and the second member is the Crow form: ku?u/kũ, ku?uci/kũci, kuné?e/kuné, kuná?aci/kunáci, pú?u/pō, pú?uci/páci, and pó?oki/póki. Note also that the description of the historical development of the forms of Hidatsa pvu is given in terms of regular sound change rather than sound change plus analogic change.

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References
