A PERCEPTUAL ANALOG OF CHANGE IN PROGRESS IN WELSH

Suzanne Boyce

Standard Literary Welsh exhibits a phenomenon known as "initial mutation," in which a lexical item may retain the initial consonant of its citation form or undergo one of three different rules that change its initial consonant by one feature. These rules are traditionally known as the SOFT, NASAL, and ASPIRATE mutations. The SOFT mutation changes voiceless stops and liquids to their voiced counterparts, and changes voiced stops to homorganic voiced fricatives. The ASPIRATE mutation changes voiceless stops to homorganic voiceless fricatives. The NASAL mutation changes voiced and voiceless stops to nasals but maintains voicing and aspiration characteristics (Fynes-Clinton, 1913). Examples (1)-(4) below illustrate, in order, the words /pot/ 'pot' and /beik/ 'bicycle' in CITATION form, and SOFT, ASPIRATE, and NASAL mutations.

(1a) (CITATION) [ə pot] The pot. (1b) [ə beik] The bicycle.
(2a) (SOFT) [ei bot] His pot. (2b) [ei veik] His bicycle.
(3a) (ASPIRATE) [ei fot] Her pot. (3b) [ei beik] Her bicycle.
(4a) (NASAL) [və mʰot] My pot. (4b) [və meik] My bicycle.

The mutations are triggered by a preceding word or a particular syntactic context rather than phonological environment. Triggering contexts are idiosyncratic and dissimilar; typical contexts for the SOFT mutation, for

+Also Yale University.

Acknowledgment. This research was supported by NICHD Grant HD-01994 to Haskins Laboratories. I am particularly grateful to Frank Gooding of the Linguistics Department at the University College of North Wales, Bangor, for sharing his time and laboratory, and to Carolyn Iorwerth for her advice and aid in finding subjects. Many thanks go to the Welsh-speaking students of University College, Bangor, and to the members of the Welsh club at Cambridge University for their voluntary participation in a somewhat frustrating experiment. I wish to thank my collaborators Cathe Browman and Louis Goldstein, and my colleagues Rena Krakow, Sharon Manuel, Harriet Magen, Doug Whalen, Andre Cooper, Karen Kay, and Margaret Dunn for reading and commenting on innumerable drafts of this paper. Special thanks are also due to Gwen Awbery, for her comments on an earlier version.

[HASKINS LABORATORIES: Status Report on Speech Research SR-76 (1983)]
instance, are after the word i 'to,' adjectives after feminine nouns, and negative verbs that begin with [b],[d],[g]. Strictly speaking, therefore, conditioning for the mutations is neither morphological, syntactic, nor phonological, but something of all three.

There is a certain amount of converging evidence that the ASPIRATE and NASAL mutations are used less and less frequently in the spoken language. Jones (1977), for instance, states that "the Aspirate Mutation after other words [than el 'her'] is rarely heard in spoken Welsh" (p. 105) and that "there is a tendency in many areas to use the Soft Mutation rather than the Nasal after an ['in']" (p. 331). The most detailed analysis of this trend may belong to Awbery (in press), who presents evidence from a number of Southern dialects that the SOFT mutation is gaining ground at the expense of the ASPIRATE and NASAL mutations. Thus, in environments where Standard Welsh would use the NASAL or ASPIRATE mutation, Southern dialects may substitute the SOFT mutation. In addition, she notes a number of environments where the ASPIRATE mutation is dropped in favor of the CITATION form. Awbery states that dialects may differ as to which environments and which lexical items undergo the change, and that these changes are more common for younger than older speakers. Her examples for the (Standard) citation forms /ka:nol/, /klawed/, and /karseg/ are given below. The mutation being applied is in parenthesis.

(5a) (NASAL-Standard form) [æq yha:nol o ðaur]
(5b) (SOFT-Dialectal form) [æq ge:nol o ðaur]
In the middle of the floor.
(6a) (ASPIRATE-Standard form) [(ni)xlawes i ðim]
(6b) (SOFT-Dialectal form) [glawes i ðim]
I didn't hear.
(7a) (ASPIRATE-Standard form) [buru a xarseg]
(7b) (CITATION-Dialectal form) [buru a karseg]
To hit with a stone.

Awbery's claim is that although these changes show considerable variation among dialects and speakers, there is a clear pattern of change in progress from a four-way to a two-way system.

Given that such a change is occurring, the everyday experience of mutation for speakers in the South must be somewhat varied; that is, speakers must be accustomed to hearing both Standard and dialectal forms in the relevant mutation contexts. From the standpoint of any one speaker’s experience, and regardless of whether the speaker's own grammar and productions are based on Standard or dialectal forms, the recognition system must anticipate alternative possibilities for those contexts of NASAL and ASPIRATE mutations in which substitutions may occur. In addition, overall, speakers must hear fewer instances of the NASAL and ASPIRATE mutations than of the SOFT mutation and CITATION forms. Presumably speakers are aware of this situation at some level of their internal grammar; that is, they must 'know' that the NASAL and ASPIRATE mutation contexts are problematic.

It is often hypothesized that language change coalesces around some point of vulnerability in the system (opacity, hole in the pattern, etc.). In this vein, it's interesting to note that even in Standard Welsh, there are many
more contexts that require the SOFT mutation than the ASPIRATE and NASAL mutations; an informal count of triggering contexts listed in Jones (1977) reveals 2 for NASAL and 10 for ASPIRATE, as opposed to 51 for SOFT. This imbalance has apparently (Warren Cowgill, personal communication) always existed in the history of Welsh; although all three mutations have been steadily losing context, the NASAL and ASPIRATE mutations have always been relatively the most impoverished. (Note, however, that both NASAL and ASPIRATE mutations occur in some very common phrases—for instance, the NASAL mutation after an 'in' and the ASPIRATE mutation after ei 'her.' This may mean that if one factor affecting vulnerability to linguistic change is frequency of usage, the particular measure applied must be based on regularity of usage, or number of forms subject to the rule, rather than simple text frequency.) Thus, historical data as well as data from current productions in spoken Welsh suggest that the ASPIRATE and NASAL mutations are weakening.

The results we present in this paper are focused on the state of the mutation system as a result of the change in progress in spoken Welsh. However, these data are derived from a series of experiments originally designed to speak to a different issue, that of the internal structure of the lexicon for morphologically related words. Because of this separation between the original aim of the experiment and the way we look at the data here, only a very brief description of the experimental design and the theory behind it is offered below. The entire series of experiments is reported in detail in Boyce, Browman, and Goldstein (in preparation).

Briefly, the experiments involved a method known as repetition priming. This technique relies on the fact that a subject who has heard or read a word recently will recognize it faster and more accurately when it is presented a second time, that is, the subject is "primed" for recognition of that word. The effect has recently been manipulated to probe the organization of the lexicon for morphologically related words by testing which pairs of related words produce a priming effect (Stanners, Neiser, Hernon, & Hall, 1979). Thus, our experiments were structured to measure priming between various forms (CITATION, SOFT mutation, etc.) of the same lexical item.

Procedure

Subjects listened first to a list of "priming" words and then to a second list of "target" words that were obscured by simultaneous random noise.

Words used were mono- and bi-syllabic masculine nouns beginning with a voiced or voiceless oral stop, and were carefully balanced for number of (citation form) initial /p/, /t/, /k/, /b/, /d/, /g/. All had stress on the first syllable.

Each word was presented in a syntactic context that required a particular mutation and was recorded onto tape by a native speaker of North Welsh. The contexts were as illustrated in examples (1)-(3) above with the addition of optional postpositions: (a) ei __ o (SOFT MUTATION); (b) ei__ hi (ASPIRATE MUTATION); and (c) __ __ oma (CITATION FORM for masculine nouns). The postpositions mean, in order, 'of him,' 'of her,' and 'here' or 'this.' (All three phrases are in current colloquial usage.) Subjects were told which phrases would occur and were asked to write each phrase in full if they could. Only full phrases with correct context and mutated form as well as correct lexical item were scored as correct responses. Note that although in general the ASPIRATE mutation is subject to dialectal substitution, the ASPIRATE mutation in the context "ei__ (hi)" is rigorously observed (Jones, 1977, p. 105).
Presumably this is due to contrast with the SOFT mutation context "ei (o)." To simplify experimental design, the NASAL mutation was not used.

Subjects

The subjects were 60 native speakers of Welsh recruited through Welsh-speaking clubs at the University of Bangor, Wales, and Cambridge University, England. Of these, 34 were born and educated in North Wales, and 26 were born in South Wales. (The major dialect boundary for Welsh runs between South and North Wales.) Forty-eight of the subjects had experience with Northern dialect from living in North Wales; the other 12 (all born in the South) were accustomed to Northern dialect from radio programs and friends. None had any difficulty understanding the Northern pronunciation of the speaker who made the tape.

Results

We present data here from two experiments. As noted above, both experiments were set up to contrast different prime-target combinations for the three contexts used; however, for our purposes here the relevant comparison is always, for instance, all CITATION form means versus all ASPIRATE mutation means, all ASPIRATE mutation means versus all SOFT mutation means, and so on.

In Experiment 1, each form of a lexical item (CITATION, SOFT mutation, or ASPIRATE mutation) was primed by that lexical item in the same form. This was contrasted with conditions in which the target word was not primed. In all, eight different lexical items (words) were used. Each was represented once in the appropriate form (CITATION, SOFT mutation, ASPIRATE mutation) in each condition. The following table shows the results as mean percent correct responses to the target form.

<table>
<thead>
<tr>
<th>PRIME:</th>
<th>SELF</th>
<th>NONE</th>
</tr>
</thead>
<tbody>
<tr>
<td>T</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>73</td>
<td>46</td>
</tr>
<tr>
<td>R</td>
<td>67</td>
<td>46</td>
</tr>
<tr>
<td>G</td>
<td>36</td>
<td>20</td>
</tr>
<tr>
<td>E</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Here we see that means for the CITATION form and SOFT mutation are nearly identical in both the SELF and NONE conditions. This means that the CITATION and SOFT mutation forms behave similarly under both presentation conditions. In contrast, the means for the ASPIRATE mutation are considerably lower. (Analysis of variance showed the difference between the three sets of means to be significant at the 1% level. A posteriori contrasts between pairs of means for the CITATION, SOFT mutation, and ASPIRATE mutation indicate this difference is due to the lower ASPIRATE mutation means. There was no significant difference between means for the CITATION form and SOFT mutation.) This suggests that, even when subjects had been previously exposed to the same word, in the same mutating phrase, words to which the ASPIRATE mutation had applied were more often misperceived. This difference between SOFT and ASPIRATE muta-
tions held for speakers born in both the South and North regions. (The interaction between mutations and area of speaker was not significant.) Rescoring in which all phrases with the correct lexical item were counted (regardless of mistakes in context or mutation heard) did not alter these results. Thus, the weakness of the ASPIRATE mutations does not represent some "bias" on the part of subjects against reporting the ASPIRATE mutation, or against reporting the "ei__hi" 'hers' context. Rather, actual recognition of the lexical item is impeded in this context.

The second experiment is essentially a replication of the first, for a larger word set and with the addition of two more prime-target conditions. The CITATION form was excluded. Thus, forms in both mutations were presented in the following conditions: (i) primed by themselves (SELF priming); (ii) not primed; (iii) primed by the citation form (BASE priming); and (iv) primed by the other mutation (OTHER priming). The following table shows the data for the SOFT and ASPIRATE mutation under each of these conditions, again as mean percent correct recognition of the target mutated form. This time, 32 lexical items were used. Again, each appeared once in each condition.

<table>
<thead>
<tr>
<th>T</th>
<th>PRIME: SELF</th>
<th>NONE</th>
<th>BASE</th>
<th>OTHER</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>SOFT</td>
<td>61</td>
<td>41</td>
<td>49</td>
</tr>
<tr>
<td>R</td>
<td>MUTATION</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G</td>
<td>ASPIRATE</td>
<td>47</td>
<td>27</td>
<td>43</td>
</tr>
<tr>
<td>T</td>
<td>MUTATION</td>
<td>49</td>
<td>49</td>
<td></td>
</tr>
</tbody>
</table>

As in Experiment 1, in all conditions those forms to which the ASPIRATE mutation has applied are poorly recognized compared to forms in which the SOFT mutation has applied. (Analysis of variance showed the difference between the two sets of means to be significant at the 3% level.) Again, this pattern holds for speakers from both regions (the interaction of area by mutation was not significant), and rescoring again made no difference.

Discussion

Taken together, these results parallel the change in the mutation system documented by Awbery. Her evidence shows the weakness of the ASPIRATE mutation, as a rule that is being replaced by another rule, and suggests that the CITATION form and the SOFT mutation contrast with the ASPIRATE as lively, well-established rules in the grammar of Welsh. The experiments described above show that this linguistic situation is reflected in (1) an equal probability that the CITATION and SOFT mutation forms will be correctly identified and (2) a greater likelihood that forms in the ASPIRATE mutation will be misperceived or missed. This result is particularly striking because, as noted above, the context "ei__hi" is an extremely robust environment for the ASPIRATE mutation. Thus, the differential effect for the ASPIRATE mutation occurs in a context exempt from the change in progress. This shows that it is the rule itself, with all the contexts in which it applies, that is problematic rather than one particular syntactic or morphological context. Further, speakers from both dialect areas show this effect of decreased perceptibility for the ASPIRATE mutation.
These results are interesting for several reasons. First, of course, our experiment constitutes independent and empirical support for Awbery's hypothesis about mutation rule change in Welsh. More importantly, our experiment shows that rule change in progress may be reflected in a tendency to confuse or misperceive input that is eligible to undergo the changing rule. We have seen that for all speakers, regardless of dialect area, any ASPIRATE mutation context is susceptible to misperception. This is clear because the misperception occurs even in the robust context 'ei hi' 'hers,' which is not subject to dialectal substitution or change. It is not clear how much this decrease in perceptibility for the ASPIRATE mutation is due to the subjects' experience of dialectal substitution in ASPIRATE mutation contexts, and how much to internal, grammar-related factors that may have led to changing productions in the first place. We know that (many) Southern speakers are accustomed to experiencing an unstable situation for the ASPIRATE mutation, but data on how much the experience of Northern speakers includes substitutions in ASPIRATE mutation contexts are currently unavailable. Production data from the North parallel to Awbery's are needed to sort out these possibilities. It is possible that a study of Northern dialects would reveal a similar pattern of change in progress. If so, then the interpretation of our data is the same for both Northern and Southern speakers, i.e., that the recognition system changes as production changes—in some cases, as in our robust 'hers' context, it may even anticipate production for environments that are eligible to undergo the changing rule, but don't. On the other hand, if no such changes are reported in Northern dialects, our experiments may have tapped the early stages of a change that has not yet emerged into production in the North.

References


Footnotes

1 More precisely, it voices [p],[t],[k],[x] and [¹h], and spirantizes [b],[d] and [m]. The fricative reflex of [g] was once realized as [γ] but has since disappeared.

2 It has been shown (Kempley & Morton, 1982) that target words that have been primed are more readily recognized in noise.
An alternative explanation for these data based on differences in discriminability for fricatives and stops may occur to the reader. Notice, however, that equal numbers of both phonetic categories appear in both mutations (e.g., [bot] vs. [veik], [fot] vs. [beik]), and that while words with initial voiced fricatives were somewhat better recognized than words with initial voiceless fricatives, words with initial voiceless stops were better recognized than words with initial voiced stops; thus, the effects should even out. In addition, a parallel experiment (not reported here) using words whose initial consonants are never subject to mutation showed the same differential effect in ASPIRATE mutation contexts. This evidence is examined in greater detail in Boyce et al. (forthcoming).