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THE INITIAL POSITION OF THE FIRST ELEMENT
OF /ai/ AND /au/ IN ENGLISH

Yutaka SOEDA

I

J.D. O'Connor has the following statement:

/at/ glides from /A/ to /i/, and the loudness becomes less as the glide progresses. Say fan fun, and then add /i/ after the /A/, with a smooth glide; this will give you fan fine. ...For /au/ start with /A/. Say tan ton, and then after the /A/-sound add an /u/; this should give taun town.¹

He seems to identify /a/ with /A/ here. Our first reaction toward his remark would be either (1) that there may be a phonetic reason for it or (2) that there may be an educational consideration behind it; that is, his instructions may be a pedagogical device, nothing more. As to /at/, Roach agrees with him that ‘this diphthong begins with an open vowel which is between front and back; it is quite similar to the A of the words ‘cut’, ‘bun’.² However, Roach’s description of /au/ is quite different; ‘...this diphthong begins with a vowel similar to a: but a little more front.’³

The purpose of this paper is to examine and confirm the nature of the first element of /ai/ and /au/, i.e. the difference, if any, between the two, based on the articulatory and acoustic data available to us.

II

To facilitate matters, let us first see how the two diphthongs are transcribed and described by some of the major phoneticians, both British and American.

Table 1
A comparison of some systems for transcribing /ai/ and /au/

<table>
<thead>
<tr>
<th>Bronstein</th>
<th>ai</th>
<th>au</th>
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<tbody>
<tr>
<td>Gimson</td>
<td>ai</td>
<td>au</td>
</tr>
<tr>
<td>Jones</td>
<td>ai (1949), ai (1960)</td>
<td>au (1949), au (1960)</td>
</tr>
<tr>
<td>Kenyon</td>
<td>ai</td>
<td>au</td>
</tr>
<tr>
<td>Ladefoged</td>
<td>ai</td>
<td>ao</td>
</tr>
</tbody>
</table>
Descriptions:

Bronstein argues that the initial position of /ai/ varies between [a] and [ɑ].

Gimson's comment is as follows: 'In the case of /ai, ao/, there may be a common (open central) starting point, ... for many speakers, the 1st element of /ai/ and /au/ may in fact be identical.' (There seems to be no particular reason for the replacement of [au] (1984) by [au] (1988) except for bringing the transcription in line with the English Pronouncing Dictionary.)

Ladefoged remarks that both of the diphthongs [ai, ao] as in "high, how" start from more or less the same low central vowel position, midway between [æ] and [a] and slightly closer to [ɑ] than to any of the other vowels. (This reminds us of O'Connor's instructions quoted earlier.) But he also says, "The diphthong [au] in 'how' usually starts with a slightly more front quality than that in 'high'."

Ward observes that this (i.e. the starting point of the first element of ai) varies from æ to a... . au might well be written as au, since the first element lies between a and a.

Wells' comment on [ai] is that phonetically, it is a wide diphthong with a starting-point which is open, unrounded, and most usually centralized-front, [ai], though front and central variants, [ar~a+1] are also common within the standard accents. ... phonetically, [au] is a wide diphthong with a starting-point which is open, unrounded, and most usually central, about halfway between cardinals [a] and [ɑ]; though centralized-front and centralized-back variants, [a~u~a+u], are also common within the standard accents. (italics mine) (Like Gimson and O'Connor, Wells replaced [au] (1982) by [au] (1990) only to bring the transcription in line with the English Pronouncing Dictionary.)

Wise introduces us to various transcriptions which are used in phonetic literature to express the diphthong [ai], such as [ai], [ai], [æi], [æe], [æj], [ai], [øy], [oj], [aj], [ai], [ʌɪ], [ʌe], [œı], and [æe].

In summary, then, all of them agree that considerable latitude is permitted between the values [a] and [ɑ] for the first element of both /ai/ and /au/, with the possibility of being identical, but also with the greater possibility of being different, as shown in the transcription [au] used by some of them.
Unlike consonants, English vowels in particular have a lot of variants. Thus the starting point of /ai/ and /au/ is no exception. The reason why both diphthongs tend to attract so much attention is clearly not only because their initial position can or cannot be identical, but also because they are unique in forming a pair of diphthongs, so to speak. Although diphthongs are usually divided into three groups in terms of how to end the second element, i.e. ending in [ə] [ɪ] and [ʊ], little, if any, attention has been paid to the fact that /ai/ and /au/ make a pair of diphthongs in terms of having the first element in common.

III

In order to be able to offer some visual materials, it will be convenient to use vowel charts used in describing English.

As we can see from Figs. 1 and 2, the first element of /ai/ is certainly close to /ʌ/, and, from Figs. 3 and 4, that of /au/ is close to /ɑː/. But that does not seem to tell the whole story, because those four figures do not take variants into consideration at all.
The starting point may vary a good deal as shown in Figs. 5 and 6. We can see from these that in most kinds of English the first element has a central quality intermediate between front and back, and is not significantly different for /ai/ and /au/, and that RP has a back starting point for /au/ near Cardinal 5 [a] and a front starting point for /ai/ near Cardinal 4 [a]. In so far as RP is concerned, Figs. 7 and 8 give more practical and useful information on this matter.

As shown in Fig. 8 in particular, the initial position of the first element of /ai/ and /au/ can be identical in RP, sharing a common acceptable area.

Finally let us look at some acoustic data on the subject. According to Shimoda (1981), who made an acoustic experiment on /ai/ and /au/ in terms of formant frequencies, it was acoustically proved that the first element of /ai/ is a little closer to /æ/ than that of /au/, which is a bit closer to /ɑː/ than that of the former, and that neither of them are the same as /æ/ or /ɑː/.
In Fig. 9 the first formant frequencies are plotted on the vertical axis and the second formant frequencies on the horizontal axis. Notice the direction of formant movement shown by the arrows; the arrows for /ai/ and /au/ cross each other at the bottom. Fig. 10 also shows much the same formant movement. Their crossing at the bottom clearly indicates that in some cases the first element of /ai/ can be closer to /a/ than that of /au/ and that the first element of /au/ can be closer to /æ/ than that of /au/ in some other cases.

By and large, Figs. 1 through 8, based on articulatory (or auditory) data, and Figs. 9 and 10, based on acoustic data, seem to show almost the same features of the initial position of the first element of /ai/ and /au/ within the standard accents of English.

IV

This may have seemed a lot of fuss about a trivial problem, but it does, as most phoneticians point out, have considerable interest, both articulatory and acoustic. In considering the problem, which is twofold, we cannot help focussing on two phonetic aspects of it at the same time; variants of each /a/ sound and, in addition, a comparison of the first element of /ai/ with that of /au/. In order to show the starting point for /ai/ and /au/ in RP, we can use any of [a], [A], and [o]. So O'Connor's instructions quoted at the very beginning are a phonetically acceptable suggestion as well as a pedagogical device. But, unfortunately, it is absolutely impossible for any sign to represent all variants. In practice, then, it would be wise to regard the initial position of /ai/ and /au/ as identical in many cases and not to forget that it can be different from dialect to dialect and
even from person to person.

Notes:
1 O’Connor (1990), p. 85.
3 Ibid., p. 22.
7 Ibid., p. 77.
9 Ibid., p. 118.
10 Wells (1982), p. 149.
11 Ibid., p. 151.
12 Wise (1957), p. 103.

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