Chapter 4: The Vowels of English. An Articulatory Classification. Acoustic Correlates. The Description and Distribution of English Monophthongs and Diphthongs

4.1. The Vowels. Criteria for Classification
4.2. The Cardinal Vowel Charts
4.3. English Vowels. The description and distribution of English monophthongs and diphthongs
   A. English simple vowels
      a. English front vowels
      b. English back vowels
      c. English central vowels
   B. English diphthongs
      a. Centring diphthongs
      b. Diphthongs to /ɪ/ 
         c. Diphthongs to /ʊ/
   C. English triphthongs

4.2. The Cardinal Vowel Charts

As we have mentioned above, vowels are sounds more difficult to define in articulatory terms than consonants and the number of vowels that can be produced by human speech organs is fairly great. In his Outline of English Phonetics (1918, reprinted in 1987), the famous English phonetician Daniel Jones claims that “a good ear can distinguish well over fifty vowels, exclusive of nasalized vowels, vowels pronounced with retroflex modification, etc.” (p. 29) It was then necessary to devise a conventional system that could be used for a more accurate specification of vowel features. On the basis of some of the most important criteria mentioned above a cardinal vowel chart was drawn (Daniel Jones had a major contribution to it) that established some reference points to which the features of any vowel in any language spoken on earth could be related. As cardinal points are used for our geographic orientation, so cardinal vowels were meant to help phoneticians more accurately find their way in the thicket of vocalic sounds. And just like in the case of cardinal points on the compass, the cardinal vowel positions were just abstract, ideal constructions which did not describe any existing, real vowel. The basic coordinates used in establishing the cardinal vowel positions were the vertical axis with the opposition high/low (close/open) and the horizontal axis with the opposition front/back. The idea was to establish extreme positions for vowel quality and use them as a reference system for all the other vowels. The human oral cavity was represented under the form of a trapezoid, conventionally facing left.
Cardinal vowel 1 is the highest and the most fronted vowel that can be ideally produced by the human phonatory system. It is marked in the IPA alphabet by the symbol [i]; the English vowel of *sill* does not exactly correspond to this position, being in fact more retracted and more open. The diametrically opposed position is that of vowel 5, which is the lowest (most open) back vowel, for which the conventional notation [a] is used. Now that two of the basic positions are established we can proceed to the identification of the remaining corners of the trapezoid. Starting from vowel 1, by gradually increasing the aperture between the tongue and the roof of the mouth we obtain the lowest front vowel [a]. In between, the intermediate cardinal position of 2 - mid-close vowel [e] - and 3 - mid-open vowel [ɛ] are established. Conversely, by raising the tongue from position 4 we can obtain increasingly closer vowels until we get to position 8 [u] which is the highest cardinal back vowel. In between, position 6 an 7 are held by the back mid-open vowel [ɔ] and by the back mid-close vowel [o] respectively.

Though, as I have mentioned, the cardinal vowels are ideal constructions, we can establish their closest equivalents among the real-world vowels. Thus, according to Daniel Jones (1987: 35), the following correspondences can be established.

1. Cardinal vowel [i]: the nearest equivalent: the vowel i in the French word *si*.
2. Cardinal vowel [e]: the nearest equivalent: the vowel e of the French word *thé*.
3. Cardinal vowel [ɛ]: the nearest equivalent: the vowel e of the French word *même*.
4. Cardinal vowel [a]: the nearest equivalent: the vowel a of the French word *la*.
5. Cardinal vowel [o]: the nearest equivalent: the vowel a of the French word *pâte*, or the vowel of the English word *lot* pronounced without lip rounding.
6. Cardinal vowel [o]: the nearest equivalent: the vowel o in the German word Sonne.

7. Cardinal vowel [ɔ]: the nearest equivalent: the vowel o of the French word rose.

8. Cardinal vowel [u]: the nearest equivalent: the vowel u in the German word gut.

The eight vowel positions thus established form the so-called primary vowel chart. Notice that five of the vowels are pronounced with spread lips and are consequently unrounded, while three of the back vowels are rounded vowels. If we modify the feature rounded for all the eight vowels and pronounce the first five with rounded lips and the last three with spread lips we obtain the secondary cardinal vowel chart which is the reverse of the first in terms of the feature rounded/unrounded. Thus, in this newly-established set all front vowels are round. Since English does not have any front rounded vowels, this chart is not relevant for the study of the vocalic system of English. We should remember, however, that if in English (and in Romanian, actually) the features front and unrounded always go together, this is not the case of all languages, French and German having each a number of front rounded vowels.

The secondary cardinal vowel chart

Though the classical standard vowel chart only includes the eight primary vowels, the central vowels are also commonly included in present-day representations of the chart.

The central lowest position is held by a variety of a that does not exist in standard English. A little higher, in a mid-open position, we find the vowel [ʌ], which frequently appears in English words like utter, cut, etc.

If we raise the tongue higher in the mouth, narrowing the passage left for the air to go out between the body of the tongue and the roof of the mouth we get the central mid vowel [a]. The position adopted by the tongue when we articulate this sound is considered to be the neutral, resting position, the vowel being actually placed right in the centre of the imaginary space we have constructed to represent the oral cavity where sounds are produced. The vowel is commonly called schwa [ə] with a Hebrew word
used to designate a diacritic marking a missing vowel. It is a very common vowel in many European languages, not only in English, and its particular importance for the English language lies in the fact that it appears very frequently in syllables where the vocalic element is not stressed. The long, tense and always stressed [ʌː] is the highest English central vowel. Even closer than it is the cardinal [i], a vowel close to the Romanian one in gând [gind], which does not exist in English.