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Critique of the IPA vowel quadrangle, especially the use of vowel points in it

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Abstract

The globally widespread kind of description of vowels by points in the IPA quadrangle with the cardinal vowels as references is very often not trustworthy in its detailed specification. The reasonable interpretation of a dot registration is namely that the vowel quality is very narrowly pinpointed. However, most phoneticians do not have the capacity to judge vowels in this detailed way. Consequently, the point notation use of the quadrangle should be abandoned, except when the judges are in command of the cardinal vowels.

This line of reasoning concerns a short time perspective. Seen in a larger perspective, other shortcomings of the quadrangle should lead to its abandonment. These shortcomings are discussed shortly.

1 Introduction

One difficult task for teachers of phonetics world-wide is the presentation to students of the Jones-IPA vowel quadrangle with the cardinal vowels as reference points. This description system for vowels is used so widely that it cannot be omitted in introductory phonetic courses of some length. No doubt, the wide distribution of the vowel quadrangle method is due to the fact that it is useful in many ways, as argued by e g Fischer-Jørgensen (1985). But theoretically, it is very badly founded. This article will first critically treat a more limited - but earlier not discussed - aspect of the use of this descriptive system and then widen the perspective and recapitulate some more general critical arguments against it that are not new.

The vowel quadrangle with its eight cardinal vowel reference points was proposed by Daniel Jones in 1917. It was soon accepted by the IPA, supplying a long-felt demand. This want was connected to the fact that the number of descriptions of different languages and dialects had increased immensely during the second half of the 19th century: Those treatments, in terms of often very precise descriptions of tongue positions, were generally unclear as concerns vowels, due mainly to the great inter-speaker variation of vocal tract shapes. Thus, it had become obvious that there was a demand for a description system that made it possible to pinpoint and compare very fine nuances of vowels in some other way, e g by reference to cardinal points. Ellis, Bell, Sweet, and Passy had made important steps towards such a system (Ladefoged, 1967, Abercrombie, 1985), and Jones took some further decisive steps, including a gramophone recording of the reference vowels.

In contrast, there has been no corresponding problem with consonants, since to a greater extent these are articulatorily anchored and not situated along continuous dimensions (Lindblad, 1997). Consequently, proposals for a corresponding general system of cardinal consonants have not been raised. However, for penetrating language and dialect contrastive studies of sibilants, such a system is needed (Lindblad, 1980).

2 Vocal dots in the cardinal vowel quadrangle

The vowel quadrangle with cardinal vowels as reference points is used worldwide to describe fundamental qualities of specific vowels and vowel contrasts within and between languages, connected to the position of the tongue body. Jones (1964) stressed the fact that the cardinal vowels are perceptual reference points that cannot be learnt from a written text but only by practice, preferentially from a teacher who knows them. Jones's students had to spend a considerable time practising these sounds, thus obtaining a deep practical knowledge of them, both auditory and proprioceptive-tactile (Abercrombie, 1985). Those who are properly trained in the use of this reference system have the possibility to communicate to each other very precise information about perceived vowel qualities by placing points in the quadrangle (Ladefoged, 1967). In Great Britain, there has been a tradition of an orally transferred skill in the command of this method. At present, I do not know to what extent it is still transferred to younger British phoneticians. However, outside Great Britain most phoneticians have not acquired a command of this system which enables them to use it properly (Abercrombie, 1985). Consequently, their descriptions of fine vowel aspects as shown by the detailed positioning of points in the quadrangle are not trustworthy. It should be added that by a point description is meant cases with actual dots as well as cases with small vowel symbols in the diagram.

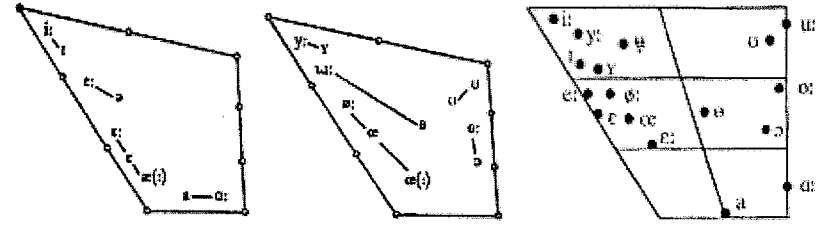

Figure 1. Vowel quadrangle representations of Central Swedish vowels in Elert (1995) and Handbook of the IPA (1999).

Examples that illustrate this lack of trustworthiness as concerns finer distinctions of vowels may certainly be found in many quarters. It can be illustrated by three recently published descriptions of Central Swedish vowels that differ in several cases as concerns the detailed positions of vowel points in the quadrangle. These descriptions can be found in Elert (1995:31), Handbook of the IPA (1999:140), and Kuronen (2000:55); in Figure 1, two of them are reproduced. The IPA Handbook description is in the section describing the Swedish sound system written by Engstrand, but the vowel quadrangle is made by some other person, according to personal communication from Engstrand. Whether this person is well schooled in the British tradition and therefore trustworthy as concerns details, is not known at present. In his personal communication, Engstrand expressed that he does not agree on the description in some aspects; this may be taken as a further support for a sceptic attitude towards fine aspects of these kinds of figures.

As concerns vowel aspects other than detailed ones, these three Swedish descriptions are concordant in most cases and certainly mainly trustworthy. The same may supposedly be said about most similar descriptions of the vowels of other languages.

However, there is no guarantee that several, probably most, readers of quadrangle point figures of vowel systems do not take for granted that not only the general position of

vowel points but also their more detailed position is scientifically well founded and thus trustworthy. It is therefore important to raise the warning that often details cannot be trusted. Textbooks and teachers should supply this information.

Consequently, the point position kind of vowel representation should be abandoned for general use, except as produced by those who command this degree of precision, and then only in cases where it is required. (Mostly, this great precision is not needed (Abercrombie, 1985)). Instead of that, the traditional - or a similar - frame might be used, but with markings of larger areas instead of dots representing vowel positions. There are however also other drawbacks with the Jones-IPA quadrangle, which have been discussed during many years; however, this discussion had not led to any change. Some such shortcomings will now be discussed.

3 More general shortcomings of the cardinal vowel quadrangle

3.1 The interpretation of the quadrangle - auditory or proprioceptive-tactile?

One great theoretical flaw of the traditional vowel quadrangle is that it is not clear whether it shall be used in an auditory or a tactile-proprioceptive way, or perhaps both-and. Among phoneticians most familiar with the tradition, opinions have differed. Thus, e g Ladefoged (1967) has expressed very distinctly that it is an auditory description method. On the other hand, Abercrombie (1985) and Catford (1977) have argued strongly that its nature is tactile-proprioceptive. In their opinion, it is a non-auditory method that describes the articulatory aspects of vowel tongue position, based not on e g X-ray pictures but on the sense of feeling of the speaker. One of their arguments against the auditory interpretation is that each secondary cardinal vowel is positioned in the same place as its corresponding primary vowel in the quadrangle, but acoustically and auditorily the difference is often great between the members of such pairs (Catford, 1981).

3.2 The need for extensive practice

It may be argued against the Abercrombie-Catford standpoint that their kind of articulatory description method is subjective and unscientific, leading to unclearness and confusion. However, also the auditory interpretation of the cardinal vowel description method is subjective in the psychological-philosophical sense that it is based on individual judgements, as contrasted to measurements in e g acoustic or articulatory registrations. This is similar to the way that voice deviations are judged by speech therapist. To be able to do their job adequately, they first have to practise together extensively. Several tests have shown that adequately trained therapist can make judgements of voice quality that agree very well. Also the cardinal vowel quadrangle system - as interpreted in an auditory or tactile-proprioceptive way - has to be practised extensively to fulfil scientific demands.

3.3 X-ray data contradict the articulatory interpretation of the quadrangle

Several X-ray studies have shown clearly that the actual tongue positions of some cardinal vowels - and also similar other vowels - do not agree with what is suggested by the Jones-IPA system as interpreted articulatorily. This is especially true of the non-close back vowels, cf e g Wood (1975).

3.4 Articulatory terms for auditory dimensions

Another flaw of this descriptive system is that the labels for the vowel positions within the quadrangle - *close*, *open*, *front*, *back*, etc - are unsatisfactory for both practical and theoretical reasons in relation to the dominating auditory interpretation of the quadrangle. No doubt, phonetic students are certainly misled - from this perspective - by these terms to think of the vowels as situated in an articulatory and not in an auditory space.

3.5 The specific shape of the quadrangle as motivated articulatorily

Still another shortcoming of the cardinal vowel guadrangle is its specific shape and the way this is motivated. Also the recently published Handbook of the IPA (1999:11-12) motivates the shape in the traditional way, by reference to the general position of the highest point of the tongue body as seen in the medial sagittal plane. For the large number of phoneticians who consider the vowel quadrangle as a kind of auditory vowel space, this foundation of it should be unacceptable. Even if an acoustic or auditory space of approximately this shape may be judged reasonable in its own right, the explicit motivation of this shape by reference to the tongue position is theoretically unwarranted.

4 The IPA quadrangle should be replaced

Evidently, due to its many shortcomings, the Jones-IPA quadrangle ought to be abandoned altogether. As a sign of the unsatisfactory vowel description conditions, several suggestions of substitutions for it have been published. One recent example, based on extensive work presented earlier in a doctoral dissertation, is Boshoff (1999). Boshoff likens the pre-sent situation to how temperature was judged before thermometers were invented. He pro-poses a very simple acoustic system in close connection to the IPA quadrangle, based on relations between F_1, F_2 and F_3.

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