THE HISTORY OF THE CLASSICAL VOWEL ARTICULATION MODEL:
A REPLY TO CATFORD AND FISCHER-JÖRGENSEN

SIDNEY A. J. WOOD

Department of Linguistics and Phonetics
University of Lund
Sweden

ABSTRACT

This paper is devoted to a discussion of Catford's (1) and Fischer-Jörgensen's (2,3) defence of the classical vowel articulation model. Objections to the model are not directed at Bell's personality, but at the theoretical structure of his model: critical functions of the model are contradicted by empirical data and by acoustical theory. Nor are the objections only relevant for amendments introduced by Jones. That argument is contradicted by the chronology of the debate.

BACKGROUND

The classical vowel model, originally introduced by Bell in 1867 (4) and modified into various versions by other authors, is characterized by the class of central vowels. The model was designed around the single resonance theory, according to which the upper surface of the tongue narrows the mouth channel locally in order to delimit the buccal cavity and tune its natural resonance. Bell postulated a configurative aperture that "may be shifted to any part of the back or front of the palatal arch" (p. 71). He held that the horizontal and vertical position of the tongue relative to the roof of the mouth set the size and location of this aperture, so that the natural resonance of the mouth cavity would rise progressively as the tongue moved from low to high at the back, central and front locations in turn.

Much of Bell's terminology was soon changed. Sweet substituted raised for the higher modification of tongue height. Ellis replaced inner and outer by retracted and advanced. The I.P.A. adopted the French tradition of four degrees of opening. Jespersen preferred three degrees, Jones followed the I.P.A. The I.P.A. and Jones retained Bell's term mixed until the 1920s, when authors undertook major revisions of their textbooks in response to Bell's original proposal, and to the negative data reported by Meyer in 1910 (5) and by Russell in 1928 (6).

The classical vowel model rapidly superseded the ancient throat-tongue-lip model. It was adopted by the neogrammarians and the I.P.A., and was hypothesized long before it could be tested. The first empirical data on the model, reported by Meyer and by Russell, contradicted some tongue heights postulated by Bell, especially for [i,e] and [o,a]. Phoneticians, already divided between the rival organic and acoustic paradigms, took sides in a bitter feud. Fischer-Jörgensen has given her personal recollections (3) of how the controversy was conducted.

Analysis of 38 sets of midsaggital vowel profiles (7,8,9), collected from the literature, confirm the anomalous heights reported by Meyer and Russell, and gave no evidence of intermediate configurative apertures, i.e., of Bell's class of central vowels. It was concluded that the classical model was based on an oversimplified acoustic theory and that it is contradicted by physiological data, which weakens its validity and explanatory power.

CATFORD'S AND FISCHER-JÖRGENSEN'S ARGUMENTS

The Value of Radiographic Data as Evidence

Catford emphasizes that Bell's and Sweet's vowel descriptions were based on perceived muscular sensation, not on objective (radiogramic) records of actual tongue position. "There is obviously a close correlation between the objective and proprioceptive data, but one should not expect them to be identical" (p. 23). This recognizes the difficulties faced by Bell and Sweet when they judged tongue positions from muscular sensation. But the argument against the classical model is not just that Bell's kinesthetic vowel judgments are sometimes contradicted by radiographic evidence. That could easily be allowed for and corrected. For example, as Catford suggests, one could recognize [i] as mid or half-open, although Jespersen rejected precisely that solution when he revised (10) in
response to Meyer's data. What the x-ray pictures revealed was that the tongue position of the traditional model was similar to the model itself, from the acoustic-phonetic perspective. So it fit within the empirical and theoretical structure of Bell's model, and not at Bell's personality or his phonetic skill.

Bell's contemporaries never disputed several positions. For example, [1] in English is low according to Bell but mid according to Atkinson. A possible reason why lowering is mid according to Bell and Sweet but low according to everyone else is that the highest point of the tongue as a reference point, and (ii) rejection of tense/lat.

These points are not supported by the chronology. Bell's contemporaries nevertheless disputed several positions. For example, [1] is mid according to Bell and Sweet but low according to everyone else. The reason why lowering is mid according to Bell and Sweet but low according to everyone else is that the highest point of the tongue as a reference point, and (ii) rejection of tense/lat.

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Ancient and Classical Mongolian are related. The shift from fronting harmony to pharyngeal harmony turns out to be a simplification, which offers an explanation for why there are no known examples of a shift in the opposite direction.

**CONCLUSION**

Catford and Fischer-Jorgensen have defended the classical model by questioning the data and by suggesting that the objections were really aimed at Daniel Jones. I have argued that hypotheses about articulation must be tested with the best available data, and I have shown that Jones's various amendments in fact represent his personal stands on older issues and that they were introduced in response to the data that contradicted the classical model.

The evidence against the classical model continues to recur and the same data consistently support an alternative solution. I do not see it as an exaggeration to report that the same data simultaneously provide confusing evidence for one interpretation and consistent evidence for an alternative interpretation.

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