

# Studies in General and English Phonetics

Essays in Honour of Professor  
J. D. O'Connor

*Edited by*  
Jack Windsor Lewis

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## STUDIES IN GENERAL AND ENGLISH PHONETICS

Rhythm, intonation, exotic and familiar languages as well as computer-synthesized audio-communications, procedures in forensic linguistics, pronunciation lexicography, language change and sociological aspects of speech such as English regional accents and dialects in Britain and other parts of the world are topics covered in *Studies in General and English Phonetics*, a collection of thirty-eight articles which has been brought together as a tribute to Professor J. D. O'Connor, one of Britain's most greatly respected teachers and writers on phonetics. The foreword to the collection has been supplied by Lord Quirk, joining the many other world-famous names on the international list of forty-five contributors who include former students, colleagues and admirers of Professor O'Connor.

This volume on descriptive and experimental phonetics and phonology will not only be of interest to readers concerned with linguistics and phonetics but also to those concerned with the teaching of English as a foreign language and readers in many other fields. With its invaluable up-to-date bibliographical matter as well as the papers themselves, no university library will be complete without it.



Professor J. D. O'Connor

STUDIES IN  
GENERAL AND ENGLISH  
PHONETICS

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## FOREWORD

We returned to UCL from war service in October 1945, Doc and I, but whereas he had managed to finish his degree before enlisting, I had only just begun. So we first met on opposite sides of the lectern, he a young lecturer, wittily and effortlessly expounding English phonology, I an over-age undergraduate, admiringly and enviously listening – and trying to learn.

Despite the passing of nearly fifty years, the teacher–pupil gap has never closed, but to my pleasure and pride it soon narrowed to the point when I could call him friend as well as teacher, could refer to him as ‘Doc’ without feeling guilty of name-dropping, and in due course (we moved slowly in those days) could so address him without feeling presumptuous.

The department was led at that time by Daniel Jones (widely known – if not widely addressed – as D. J.), who seemed to me simultaneously shy and austere, not easy to know. In contrast, Doc was prominent among a group of colleagues who were delightfully at ease with each other and their students: A. C. Gimson, of course, Hélène Coustenoble (also known as Gim and Cou), Dennis Fry, Gordon Arnold, Olive Tooley, Julian Pring, Marguërite Chapallaz, John Trim. And despite attacks by the grim reaper, it has been a special pleasure week by week to see several of those colleagues and friends foregather in the UCL common room – at a particular table, on a particular day: joined too, in consequence, by former students from the international community of those who have looked to Doc and his peers for advice, information, good company and sheer fun.

His peers? Well, no. It would be hard to find any colleague making claim to be his peer, for Doc is quite unique: *primus* no matter who else he is *inter*, even this splendid gathering of linguists intent, in the pages that follow, on honouring him.

Randolph Quirk

## ABOUT J.D. ('DOC') O'CONNOR

Professor Emeritus Joseph Desmond O'Connor of University College London is universally with happy informality known as 'Doc'. He was born on 10 December 1919 and grew up in the handsome spa and market town of Harrogate in what was then the West Riding of Yorkshire 200 miles north-west of London. His forebears had moved from Ireland first to Newcastle. His father was a postmaster in different parts of the country including Northallerton and Maidenhead. His mother came from Harrogate, where her father was at one time the mayor.

For his senior schooling, like a number of Harrogate boys, Doc travelled daily to the Jesuit foundation St Michael's College at Leeds. From there he proceeded to University College London in 1937. When the Second World War broke out he was in the final year of a BA Honours course in French. Despite the fact that his department, like the Department of Phonetics, had been evacuated to Aberystwyth he got a first. Before the end of 1940 he was off to the West Country to train with the Royal Armoured Corps. He served in the army throughout the war, like his friend A. C. Gimson rising to the rank of major. His talents had greatly impressed his teacher of French phonetics, the redoubtable H el ene Coustenoble, and in turn Professor Daniel Jones, the founder and head of the Department of Phonetics at UCL. In 1945 he returned to the department to join its teaching staff.

He has never been an avid globetrotter, though he did accompany Daniel Jones and other colleagues to take part in teaching courses on English in Denmark and in France. A notable stay was his several months in 1954 at the famous Haskins Laboratory in New York.

In 1964 he was persuaded to take over from Randolph Quirk the annual University of London Summer School of English, in its heyday the most remarkable course of its kind running in the country. While he was in charge, it regularly accommodated well over 200 participants and engaged as visiting lecturers many famous people from a wide variety of British walks of life. He conducted it with great good humour and modesty and was immensely popular with the students and no less so with his numerous teaching staff until he finally gave it up in 1973.

ABOUT J. D. ('DOC') O'CONNOR

University College recognised his splendid contribution to his subject and his important part in the development of his distinguished department, through which have passed so many leading figures in the field of phonetics, by appointing him to a Chair of Phonetics in the session beginning in 1976. At his slightly early retirement from teaching in 1980 the title of Emeritus Professor was conferred upon him.

## THE PUBLICATIONS OF J. D. O'CONNOR

Doc's publications have been many and varied. He has written quite a number of reviews, some of books only available in French or Danish. He has written more books falling in that important and these days undervalued category of phonetic reader than anyone else has or is likely to. His masterpiece, the amazingly wide-ranging Penguin *Phonetics*, is of course very widely recognised as probably the best general introduction to the subject, rivalled only by Abercrombie's *Elements*. Happy the newcomer to the subject who is able to read both of them.

He is no less famous for the 1961/73 *Intonation of Colloquial English* on which he collaborated with his distinguished colleague Gordon F. Arnold. The highly effective and satisfyingly accurate recordings they made of a substantial amount of its text on more than one occasion have richly benefited many generations of students of the subject. His superb *Better English Pronunciation* was described in the *Times Educational Supplement* in March 1975 as a book 'which can quite safely be said to be the most effective one ever written to help the ordinary learner to improve his pronunciation'. Besides this he has written articles that have been acknowledged as classics of the literature of phonetics such as the 1953 *Word* article which earned a place among two dozen of the most seminal articles on the subject of *Phonetics in Linguistics* as selected by John Laver and the late Bill Jones in that 1973 volume of fundamental readings for postgraduates. The latest of his various fruitful collaborations was with his only daughter Clare Fletcher, who was also the other voice in the very lively recording that accompanied the 1973 Phonetic Drill Reader.

The following list is not complete – it takes no account of his broadcast scripts or teaching films – but it is hoped that it omits nothing of major importance.

- 1947 'The phonetic system of a dialect of Newcastle-upon-Tyne', in *Le Maître phonétique*.
- 1948 *New Phonetic Readings*, Berne: A. Francke AG.
- 1950 Review of K. L. Pike's *Phonemics* in *Le Maître phonétique*.

THE PUBLICATIONS OF J. D. O'CONNOR

- 1951a 'Styles of English pronunciation', *English Language Teaching* 6.  
 1951b Review of Trager and Smith *An Outline of English Structure* in *Le Maître phonétique*.  
 1952a 'RP and the reinforcing glottal stop', *English Studies* 33.  
 1952b 'Phonetic aspects of the spoken pun', *English Studies* 33.  
 1952c 'A transcription in Southern British English from *The Wind in the Willows* by Kenneth Grahame', *Le Maître phonétique*.  
 1953a 'Vowel, consonant and syllable – a phonological definition' (with J. L. M. Trim), *Word* 9, 2.  
 1953b Review of Bullard and Lindsay *Speech at Work* in *Le Maître phonétique*.  
 1955a *A Course of English Intonation*, Amsterdam: Meulenhoff.  
 1955b 'The intonation of tag questions in English', *English Studies* 36.  
 1956a *English Intonation*, Stockholm: Radiotjänst.  
 1956b Review of Abbé R. Charbonneau *La Palatalisation de t d en canadien-français* in *Le Maître phonétique*.  
 1957a 'The fall-rise tone in English', *Moderna Språk* (Sweden), 51, 1.  
 1957b 'Acoustic cues for the perception of initial /w, j, r, l/ in English' (with Gerstman, Liberman, Delattre and Cooper), *Word* 13.  
 1957c 'Recent Work in English Phonetics', *Phonetica* 1.  
 1957d Review of D. Abercrombie *Problems and Principles* in *Le Maître phonétique*.  
 1957e Review of P. Christophersen *An English Phonetics Course* in *Le Maître phonétique*.  
 1958a 'Synthesis of English vowels' (with G. F. Arnold, P. Denes, A. G. Gimson and J. L. M. Trim) *Language and Speech* 1, 114–25.  
 1958b Review of J. R. Firth *Papers in Linguistics 1934–51* in *Le Maître phonétique*.  
 1960a Review of P. Strevens *Aural Aids in Language Teaching* in *Le Maître phonétique*.  
 1960b Review of Thomson and Lyons *Spoken English* in *Le Maître phonétique*.  
 1961a *Intonation of Colloquial English* (with G. F. Arnold), London: Longman.  
 1961b Review of J. Vachek *Dictionnaire de linguistique de l'école de Prague* in *Le Maître phonétique*.  
 1961c Review of E. Sivertsen *Cockney Phonology* in *Le Maître phonétique*.  
 1962a *BBC Course of English Pronunciation*, London: BBC Enterprises.  
 1962b *BBC Course of English Intonation*, London: BBC Enterprises.  
 1963a Review of A. Martinet *A Functional View of Language* in *Le Maître phonétique*.  
 1963b Review of G. Faure *Recherches sur les caractères et le rôle des éléments musicaux dans la prononciation anglaise* in *Le Maître phonétique*.  
 1963c Review of D. Pasquale *A Practical Handbook of English Pronunciation* in *Le Maître phonétique*.

THE PUBLICATIONS OF J. D. O'CONNOR

- 1964 'The perceptibility of certain word boundaries' (with O. Tooley) in D. Abercrombie *et al.*, *In Honour of Daniel Jones*, London: Longman.
- 1965a Review of J. Vachek *A Prague School Reader in Linguistics* in *Le Maître phonétique*.
- 1965b 'The perception of time intervals', *Progress Report 2*, Phonetics Laboratory, University College London.
- 1967a *Better English Pronunciation*, Cambridge: Cambridge University Press.
- 1967b Review of E. Henderson *Tiddim Chin* in *Le Maître phonétique*.
- 1968a 'The duration of the foot in relation to the number of component sound segments', *Progress Report*, Phonetics Laboratory, University College London.
- 1968b Review of H. A. Koefoed *Fonemik* in *Le Maître phonétique*.
- 1968c Review of B. S. Andrézen *Pre-glottalisation in English Standard Pronunciation* in *Le Maître phonétique*.
- 1968d Review of P. Garde *L'Accent* in *Le Maître phonétique*.
- 1968e 'Daniel Jones 1881–1967', *English Studies* 49, 238–9.
- 1970 Review of D. Crystal *Prosodic Systems and Intonation in English* in *Le Maître phonétique*.
- 1971 *Advanced Phonetic Reader*, Cambridge: Cambridge University Press.
- 1973a *Intonation of Colloquial English* (with G. F. Arnold), 2nd edn, London: Longman.
- 1973b *Phonetic Drill Reader*, Cambridge: Cambridge University Press.
- 1973c *Phonetics*, Harmondsworth: Penguin.
- 1973d Review of D. Wilkins *Linguistics in Language Teaching* in *Le Maître phonétique*.
- 1980 *Better English Pronunciation*, 2nd edn, Cambridge: Cambridge University Press.
- 1989 *Sounds English* (with Clare Fletcher), London: Longman.

## ABOUT THESE STUDIES

The contributions to this volume have been divided into four groups but the categories adopted inevitably overlap in various ways. In particular a number of items placed in part II Pitch, Intonation and Rhythm could equally well have gone into part IV The Phonetics of Non-Mother-tongue English.

### PART I GENERAL PHONETICS AND PHONOLOGICAL THEORY

1 **Tsutomu** ('Steve') **Akamatsu**, who, like his wife Maryvonne, a fellow phonetician, has happy memories of sitting at Doc's feet at University College London, applies his 'functionalist' approach with logic and clarity to some well-known neutralisations in English phonology and draws our attention to, among other things, developments that have come about by 'loosening of articulation'.

2 **Andy Butcher's** paper on some consonantal features in a variety of Australian languages reminds me irresistibly of the early reports of naturalists on the amazingly novel flora and fauna of the antipodes. Rich alike in its theoretical speculation and its solid body of field observations, it includes accounts of some types of human articulations little paralleled in the northern hemisphere where so much the majority of phonetic observers have functioned.

3 **Bruce Connell** starts from an examination by electropalatography of the tap articulations of a speaker of *Ibibio*, one of the Lower Cross languages of south-eastern Nigeria, and opens the discussion out into a searching reconsideration of the nature of tap articulations in general and of their relationships not merely with flaps but even with stops and approximants. He argues that solely distinguishing stops from taps by duration leaves out of account the at least equally important matter of linguo-palatal contact.

#### ABOUT THESE STUDIES

4 **Bill Hardcastle** deals with certain English assimilations in an immensely rewarding practical way using fairly recently developed techniques like electropalatography and laryngography to reveal to us the gross oversimplifications that merely auditory analyses have limited us to in the past.

5 **Hermann Kühnel**, Germany's leading forensic phonetician, has produced an impressive survey of the controversial field of forensic speaker identification which is about as satisfying and authoritative a treatment of the topic as one could imagine at anything like a moderate length. Certainly, for anyone who feels inclined to dip a toe into this topic, there could be no better choice of the first thing to read.

6 **John Laver**, with characteristic lucidity and thoroughness, discusses the various possibilities and choices involved in the employment of computer-incorporated recorded vocal responses (whether of synthetic or of human speech) of machine to telephone caller for a wide range of possible situations. This important topic, which so recently belonged only in science fiction, is becoming a more urgent real-life problem day by day.

7 **Moray Nairn** and **Jim Hurford** used digital processing to excise steady-state portions of vowels from certain CVC contexts and provided the results suitably disguised along with the same vowels in their original consonantal surroundings to four professional phoneticians for transcription. Notable variability between the transcribers was found in the judgements of the vowel qualities. The results were seen to support the contention that formant transitions aid vowel identification and to throw doubt upon the complete aptness of the usual vowel chart 'as a map of the real human possibilities'.

8 **Tony Traill** examines data from assimilation and language change in the Khoisan languages of southern Africa (Bushman and Hottentot are the two best known) which provide an important new perspective on the natural classes of clicks for which the traditional purely articulation-based categorisations are shown to be unsatisfactory and best replaced by phonetic classifications based on their acoustic features.

9 Those who know '**Luke**' **Van Buuren** for the radical thinker he is will certainly not be disappointed with this paper in which in convincing and entertaining fashion he makes the case for the recognition of what he terms neatly the 'postura'. He is not afraid to point out where he thinks Daniel Jones was 'sloppy' and offers forthright condemnation of the unfortunate way the term 'labialisation' is traditionally misapplied.

## ABOUT THESE STUDIES

### PART II PITCH, INTONATION AND RHYTHM

10 **Patricia** and **Michael Ashby's** stimulating experiment makes some fascinating points and raises still more. It reminds me of my frequently uncomfortable reactions to using an answerphone which gives a lot of useful information by a realistically synthesised voice which, however, gives all numbers on a rising tone but all zeros falling no matter what the context. The algorithm they produce should enable an important step forward in the design of chips to provide natural prosodies for synthetic speech.

11 **Alan Cruttenden** takes on one of the most widely discussed topics in current intonation studies and deals with certain rising intonations especially heard in more northerly British cities (in Ulster, Glasgow, Newcastle, Birmingham, etc.) and in regions around the rim of the Pacific Ocean (Australia, California, Canada). This account of the 'High Rise Tone' phenomenon is no doubt the fullest and most important treatment it has received to date.

12 **Dave Crystal** who, in association with Randolph Quirk and also in his independent work, has made some of the most notable ever contributions to the study of English rhythm, turns again to the topic with some characteristically lively comments on its possible future development. They are conveyed with a highly diverse and diverting variety of illustrative references and it is perhaps possible that his tongue edges just a little into his cheek at times.

13 The data that **Ellen Douglas-Cowie**, **Roddy Cowie** and **Joan Rahilly** have assembled have clearly justified their impression that it might be rewarding to compare the intonational habits of Belfast people by sex, generation and class affiliation. They rightly point out that sociophonetic investigations have unwarrantably been almost exclusively hitherto in the domain of segmental data and they convincingly point the way forward to a useful broadening of the field.

14 **Tony Fox's** consideration of intonational typology started from fresh data, on a small number of general parameters, of eight prosodically disparate languages, viz. English, French, German, Cantonese, Mandarin, Japanese, Mende and Zulu. Among his many interesting conclusions is one that a category such as 'nuclear tone' is not tenable as a universal and in fact that a typology of intonation as such is not feasible since such inter-language differences can better be ascribed to the different overall prosodic structures of the languages rather than to the intonational features themselves.

15 **Jill House** throws herself energetically into the fray in one of the most extensively disputed areas of intonation theory, the analysis of tonal patterns considered to be related to the expression of stereotyped ideas. She brings to it insights that are the fruits of, among other things, work she

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has done observing numbers of telephone conversations where enquiries of a repetitive kind are being answered. She displays a thoroughly independent outlook and offers some interesting conclusions.

16 **Allen Hirson, Peter French and David Howard**, two academic phoneticians and a former academic who is now Britain's leading specialist in forensic phonetics, investigated the pitch of the speaking voice as heard over a telephone line and in face-to-face communication from twenty-four youngish male subjects. Among their suggestions regarding the forensic relevance of their findings is one that, where fundamental frequency from a telephone caller is lower than that from a direct speech sample, it may be taken as strongly indicating that different speakers are likely to be involved.

17 **Francis Nolan** describes an experiment designed to contribute to the debate among tonologists as to whether declination, the progressive lowering of fundamental frequency that generally characterises intonation units, is an overall feature of whole units or derives essentially only from individual relationships with immediately preceding pitch accents. The experiment is closely modelled on a previous one by two American scholars but with an important modification in that emphases were introduced on particular items in the read-aloud lists that were their basis. His results were rewardingly positive.

18 **Héctor Ortiz-Lira** gives the results of tests carried out to provide experimental evidence of Spanish-speakers' departures from the norms of English sentence accentuation especially when English does not place the nucleus on the last lexical item in the word group. Thirty-five fairly randomly selected Chilean teachers were recorded reading dialogues. Interference from Spanish-language habits duly showed up in their restressing of given information and accenting of sentence-final adverbials etc.

19 **Graham Pointon** reports an investigation of Spanish rhythm based on six readings of the familiar IPA version of the Aesop fable *The North Wind and the Sun*. His measurements of the durations of the segments, of their syllables and of the inter-stress intervals confirmed him in his rejection of the traditional classification of Spanish as a syllable-timed language. He proposes instead to assign it to a new category, 'segment-timed', which he argues is also the most appropriate categorisation of infant speech.

20 **Paul Tench** addresses the topic of the intonation unit boundary. He carefully reviews the work of the chief writers to have most recently tackled this problematic field and in particular draws attention to the weaknesses of Halliday's handling of the problem, finally opting for an approach that profits especially from the work of Jassem and Pike.

21 **László Varga** gives an account of the parallels and dissimilarities

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between the intonational treatment of stereotypical expressions in English and in his native Hungarian. In general he finds that the formal and functional properties of the Hungarian 'stylized fall' are remarkably though not precisely similar to those of the corresponding English phenomenon. Although he apparently accepts the Robert Ladd line in terminology, his discussion does something to undermine this questionable recent orthodoxy in the explanation of the semantic value of the pitch pattern in question.

22 This item, by the editor, deals with questions of the teaching of English intonation to those for whom the language is not their mother tongue. It argues that too many teachers are doubtful of the adequacy of their handling of the matter. It suggests that in spontaneous speech only tonicity presents real problems. For those who wish to read aloud literature as authentically as native speakers some traditional studies are recommended.

#### PART III THE PHONETICS OF MOTHER-TONGUE ENGLISH

23 **John Baldwin**, in discussing consonant capture, offers many interesting examples of the ways English-speakers may quite often be heard to depart from the traditional 'rules' by which the mainstream forms of English generally do not allow the final consonants of words to attach themselves to vowels beginning following words. He is able to draw for evidence on his files of observations as the country's longest active practitioner in the field of forensic phonetics.

24 **Nik Coupland** ventures into a very controversial area with his provocative comments in the hinterland between between phonetics and sociolinguistics. He sees all proper-name pronunciations as having rights and obligations attached to them. Among various comments regarding pronunciation and cultural identity, he points out how certain local anglicisations of Welsh words 'subvert Welsh ethnicity' at Cardiff where so many born and bred there like myself are less than enthusiastic to be labelled 'Welsh'.

25 **Laurie Bauer** offers us salutary help in avoiding too simplistic a view of the categorising of various versions of words as 'spelling pronunciations'. The conservative speaker may find his new data something of a chamber of horrors but he points out a direction in which we need not doubt that we all travel further every day. He adds some interesting speculations regarding what he thinks may be a tendency towards syllable timing and others about the social causes of the phenomenon.

26 **John Higgins** makes enterprising use of a database in the form of a very substantial English wordlist to establish remarkably complete accounts of

#### ABOUT THESE STUDIES

various types of English homophones. His findings illustrate, amongst other things, the fact that computers can now be used to take a good deal of the drudgery out of the compilation of useful practice materials for the teaching of English pronunciation.

27 **John Kelly's** stimulating account of consonant 'resonance' contrasts that exist between the accents of three regions of England reminds one that there are more things differentiating people's accents than have yet been fully accounted for. It deals with complexes of articulatory elements which extend to different degrees over stretches of speech in various language varieties and points to new research opportunities in an area which, as he rightly insists, is not merely of phonetic but also of phonological interest.

28 **John Local**, from a basis of non-segmental Firthian phonology, Abercrombian word-rhythm analysis, etc., deals with matters of timing and rhythm in respect of word syllabification and ambisyllabicity. He illustrates his conclusions from his work on speech synthesis using his YorkTalk speech-generation system to impressive effect.

29 **Derrick McClure**, having examined the monophthongs of seven speakers from widely separated parts of Scotland, uses his spectrographic data to devise an economical distinctive-feature system for Scottish Standard English as a whole that is plainly strikingly different from what would be applicable to the other well-known varieties of Standard English.

30 **John Maidment** draws attention to a little noticed feature of a traditional-dialect mainly eastern and northern Midland value of the vowel in words such as *shirt* which has occurred in Lincolnshire, Nottinghamshire, Leicestershire, Cheshire, Staffordshire and his native Derbyshire in a form with a quality comparable to an ordinary version of *shot* or *short*.

31 **Clive Upton** begins with what happens to the *cup* and *foot* vowels at the transitional zones between dialect regions in northern and southern England where groups of words may show either a mixture of two different types of sound distribution or neither of two alternatives but an intermediate compromise sound. But he goes beyond that and, among various matters of note, he shows (with an illuminating map) that the ancient quality of the *cup* vowel has been found to have persisted in very southerly areas indeed.

32 **Henry Warkentyne** and **John Esling** draw attention to a vowel quality difference between Canadian English and General American that has been hitherto overlooked. They point out that, by contrast with the General American tendency to raise the 'ash' vowel /æ/, Western Canadian English seems to share the southern British tendency to lower it. Their data on 128 speakers of diverse age, class and sex taken from an auditory survey of Vancouver English made by Gregg *et al.* in 1985 clearly demonstrate that the

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well-known /ai/ and /au/ differences are not the only ones of note between the Canadian and the General American accents of English.

33 **John Wells**, in his article 'Syllabification and allophony' in our sister volume *Studies in the Pronunciation of English* (ed. S. Ramsaran, London: Routledge, 1990: 85), confessed to being worried by 'the apparently wayward behaviour of /r/' in words like *memorise* in which it clearly begins the last syllable instead of belonging to the previous one as predicted by his theory of English syllabification set out in that article. His extension of that theory with the ingenious addition of a new rule of 'sonorant left capture' expounded in the present article means that he is now a happy man about such things.

#### PART IV THE PHONETICS OF NON-MOTHER-TONGUE ENGLISH

34 **Bev Collins** and **Inger Mees** are pioneers in the application of voice quality studies to language teaching, offering new techniques to the next generation of teachers. Their work makes new observations and raises many interesting questions. Just two are: 'How far can General American speakers be assumed to share a set of vocal-setting features?' and 'Are the specifically GA features that Danish users of English may acquire likely to increase their intelligibility and/or acceptability to non-GA interlocutors?'

35 **Yves Le Clézio**, in investigating Shilluk, a little-known and not popularly spoken Nilotic language of southern Sudan, needed to record many of his specimen words with accompanying English glosses which have provided the materials for this snapshot of Shilluk-influenced English in which, among its various interesting features, we learn that confusion can occur between /p/ and /f/, between /t/ and /s/ and even between /k/ and /tʃ/.

36 **Inge Livbjerg** and **Inger Mees** demonstrate strikingly and with great practicality what pitfalls there are in the teaching of pronunciation if the teacher has not got an adequately precise and up-to-date knowledge of the phonetics of both the interfering language and the target model. It is very appropriate that some of their data derive from recordings of Doc O'Connor working with Inge on her English pronunciation a couple of decades ago.

37 **Jan Posthumus** addresses himself cogently to the widespread 'ignorance of the basic realities of loan-word pronunciation in native language settings', vigorously demolishing the fallacy that any departure from the precise phonetic values of the lending language is a regrettable fall from grace. He makes his case by reference to the behaviour of English loans in Dutch. The misapprehension taints the practice of the compilers of even

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the best English dictionaries (*OED*, 2nd edn, 1989, p. xxxiii ominously refers to its 'phonetic representation of unassimilated foreign words'). Now that we are getting CD-ROM versions of dictionaries with audible pronunciations this is a truly timely topic to have raised.

38 **David Taylor** offers his optimistic recipe for 'a new lease of life for phonetics and phonology in the context of pronunciation teaching'. His proposal is that teachers should not focus on imparting a particular accent of English but should 'take the transcription itself as the target' because the transcriptions of Gimson, Wells, etc. represent 'something much wider' than is explicitly purported by their purveyors. It is interesting to consider how far he is recommending a new departure or the recognition of a fact of life.

Part I

**GENERAL PHONETICS  
AND PHONOLOGICAL  
THEORY**



## On some neutralisations and archiphonemes in English allegro speech

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Paul Passy (1906: 39) mentioned 'prononciation familière ralentie' in reference to pronunciation, in his opinion, best suited for teaching purposes. This style of pronunciation was later referred to as 'slow conversational style' (Jones 1945: 127) or that of 'natural, unstudied but reasonably careful and not rapid conversation' (Jones 1950: 9), and on it Jones based his formulation of the phoneme. The pronunciation of individual words as indicated in various pronouncing dictionaries, etc. is largely what one would expect in such a style.

When a language is spoken naturally, we find, more often than not, allegro speech. To observe and account for various phonetic phenomena, it seems important to distinguish between two levels of articulatory care characteristic of non-allegro speech and allegro speech, respectively.

Traditionally, the phonological system of a given language is presented in terms of non-allegro speech. This is perfectly legitimate, but there should also be some reference to the phonology of allegro speech. These two kinds of phonology are not mutually exclusive. What happens in non-allegro speech inevitably happens in allegro speech as well. One and the same speaker may exhibit features of both in free variation (see Martinet 1988: xiv).

As the rate of speech increases, co-ordination in executing the various articulations necessary in the production of a sound deteriorates simply because the speech organs find it increasingly difficult, in the progressively less time available, to maintain reasonably clear-cut implementation of them. A transition between an articulation and an adjacent one may be less than satisfactorily executed, giving rise to the phenomenon of assimilation whereby successive sounds become more or less homogeneous. Often a whole sound may be omitted.

These phonetic phenomena of elision, loosening of articulation and assimilation are among those which most characteristically and frequently

occur in allegro speech both within individual words and at word boundaries. According to Ramsaran in Gimson ([1962] 1989: 308–11), elisions occur most typically in allegro speech, while assimilations occur equally in either allegro speech or non-allegro speech. Both allegro and non-allegro speech can be formal or casual. Assimilations are more frequent in casual than in formal speech regardless of whether it is allegro or not. We shall be concerned here with assimilations in allegro speech. It is rare for a type of assimilation to occur in non-allegro but not in allegro speech. Assimilation can be unidirectional, i.e. progressive or regressive: for example, the occurrence of [p̚] (labiodental) as in *cupful* in allegro speech instead of [p] (bilabial) is due to regressive assimilation; the occurrence of [ŋ] (velar) as in *bacon* in allegro speech instead of [n] is due to progressive assimilation. Assimilation can be bidirectional: for example, the occurrence of [m̥] (voiceless) as in *campement* [kãmmã] instead of [p] in allegro speech in French results from the sustained lowered posture of the soft palate all the way from the first [ã] to the second [ã], with the result that what would be [p] in the non-allegro pronunciation of this French word is nasalised (Martinet 1969: 128–9).

Elision which results in the omission of one or more sounds in an individual word most frequently affects a close or central vowel in the immediate neighbourhood of continuants like [n], [m], [ŋ], [l] and [r]. Witness, for example, the elision of such vowels in the first syllables in *police*, *correct*, *believe*, etc. (cf. Gimson 1962: 231–2). In English and German, for example, certain of the so-called weak forms are more characteristic of allegro speech than some other weak forms of the same words. Interaction of elision and assimilation in allegro speech is very frequent, elision being the starting-point in this case (cf. *haben* ['ha:bən] > ['ha:b̥m] > ['ha:m̥m] > ['ha:m̥] > [ha:m] in German). One finds a useful account of this topic in German in Kohler (1977: 213–19). One example worth mentioning, so far as English is concerned, would be what is frequently given in dictionaries in the spelling *gonna* (i.e. *going to* used in reference to 'future') – variously pronounced as ['gɔnə], [gənə], etc. – which is associated with a complex interplay between elision and assimilation.

Loosening of an articulation can occur in non-allegro as well as allegro speech. Gimson (1962: 154) appears to associate loosening characteristically with allegro speech ('in rapid, familiar speech', as he puts it), when he refers to instances of incomplete closure of plosives (e.g. *baker* pronounced ['beɪxə]), though I have observed the same phenomenon even in *formal non-allegro* speech (e.g. *Buckingham* pronounced with [x] instead of [k]). Compare the phenomenon in German whereby *habe*, for example, is pronounced with [β] (fricative) instead of [b] (plosive) (Kohler 1977: 210).

Gimson (1960; 1962: 270–2, 274) draws our attention to 'the instability of English alveolar articulation', notably word-final alveolars. Though he

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makes no explicit reference to allegro speech in this connection, its involvement seems obvious. By 'instability of final alveolars' is meant the phenomenon whereby a word-final alveolar phoneme (/t/, /d/, /n/) is said to be regressively assimilated in respect of the place of articulation to some following word-initial non-alveolar phoneme (e.g. /p/, /b/, /m/, /k/, /g/): for example, the alveolarity of /t/ in *that* will be assimilated to the bilabiality of /p/ in *pen*, so that *that pen* will be pronounced [ðæp pen]. Gimson further mentions coalescent assimilation between word-final /s/ or /z/ and following word-initial /ʃ/ or /j/ (though I would postulate /i/ instead in these cases), e.g. *this shop*, *this year*, *those young men*, *is she*. I deliberately leave them out of account here since the type of assimilation involved is coalescent rather than regressive and the pattern of replacement is not quite the same as in the other cases. Below is Gimson's (1960: 8–9) presentation, somewhat modified.

- 1 /t/ > /p/ before /p, b, m/, e.g. *that pen*, *that boy*, *that man*.
- 2 /t/ > /k/ before /k, g/, e.g. *that cup*, *that girl*.
- 3 /d/ > /b/ before /p, b, m/, e.g. *good pen*, *good boy*, *good man*.
- 4 /d/ > /g/ before /k, g/, e.g. *good concert*, *good girl*.
- 5 /n/ > /m/ before /p, b, m/, e.g. *ten players*, *ten boys*, *ten men*.
- 6 /n/ > /ŋ/ before /k, g/, e.g. *ten cups*, *ten girls*.

Gimson understandably calls the result of the above type of phonetic modification through regressive assimilation 'a phonemic change'. He interprets [ðæp pen] as phonologically /ðæp pen/. The identification of such distinctive units, which are said to replace the 'original' alveolar phonemes, is traditionally made, as shown above, through simple recourse to the criterion of phonetic similarity.

An alternative phonological analysis is possible for those who operate with the concepts of 'commutation test', 'phonological opposition', 'neutralisation', 'archiphoneme', 'phoneme', 'relevant feature', etc., to whom I shall hereafter refer as functionalists. (For my own understanding of these concepts, see Akamatsu 1988, *passim*, or Akamatsu 1992, *passim*.) For functionalists these phonological changes are instances of neutralisation. To the best of my knowledge, no phonological analysis of such examples in terms of neutralisation in allegro speech has appeared in published form, hence my present attempt.

My first task is to characterise in terms of relevant features all the nine phonemes (/p/, /b/, /m/, /t/, /d/, /n/, /k/, /g/, /ŋ/) involved.

/p/	'voiceless	bilabial	non-nasal'
/b/	'voiced	bilabial	non-nasal'
/m/		'bilabial	nasal'
/t/	'voiceless	apical	non-nasal'
/d/	'voiced	apical	non-nasal'

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/n/		'apical	nasal'
/k/	'voiceless	dorsal	non-nasal'
/g/	'voiced	dorsal	non-nasal'
/ŋ/		'dorsal	nasal'

The concept of 'relevant feature' (on which see e.g. Martinet 1965: 138–40) should not be confused with the concept of 'distinctive feature' employed in generative phonology: for instance, the relevant feature 'apical' implies that all the required articulations involve the tip (i.e. apex) of the tongue, whether these articulations are alveolar (cf. *tea*), dental (cf. *eighth*) or postalveolar (cf. *tree*). Note that a glottal plosive as a realisation of /p/, /t/ or /k/ in word-final position is precluded in the present discussion.

The word-final distinctive unit in each of the six cases mentioned further above which replaces an 'apical' phoneme is different from the distinctive unit identified (as a phoneme) by Gimson. Let me take just the first case (i.e. item 1 in the list). The opposition between /p/ ('voiceless bilabial non-nasal') and /t/ ('voiceless apical non-nasal') is valid in some contexts, say, word-initially (cf. *pan* /pæn/ vs *tan* /tæn/) but is neutralised before /p/, /b/ or /m/ (there is phonetically no distinction between e.g. *ripe* [... p] *pears* and *right* [... p] *pears*), as the opposition between the relevant features 'bilabial' and 'apical' is cancelled and the archiphoneme characterisable as 'voiceless non-dorsal non-nasal' which is the sum of the relevant features shared by /p/ and /t/ occurs. I indicate this archiphoneme as /p-t/ and do likewise, *mutatis mutandis*, for the other archiphonemes.

Below then are those distinctive units which Gimson identifies as the phonemes (/p/, /b/, /k/, /g/, /m/, /ŋ/) replacing the 'original' phonemes (/t/, /d/, /n/). I shall give, in each case, the phoneme which Gimson identifies, followed by the distinctive unit, the archiphoneme.

1 /p/ ... the archiphoneme /p-t/ 'voiceless non-dorsal non-nasal' associated with the neutralisation of the opposition between /p/ and /t/. It is realised by [p]. In the context where /p-t/ occurs (i.e. before /p/, /b/ or /m/: e.g. *ripe* /... p-t/ *pears* /p.../; *right* /... p-t/ *pears* /p.../; *right* /... p-t/ *mayors* /m.../), it is opposed to, among other distinctive units, /k/ 'voiceless dorsal non-nasal' (as in *thick* /... k/ *pen* /p.../; *sick* /... k/ *boy* /b.../; *sick* /... k/ *man* /m.../), /b-d/ 'voiced non-dorsal non-nasal' (as in *good* /... b-d/ *pen* /p.../; *good* /... b-d/ *boy* /b.../; *good* /... b-d/ *man* /m.../) and /m-n/ 'non-dorsal nasal' (as in *ten* /... m-n/ *players* /p.../; *ten* /... m-n/ *boys* /b.../; *ten* /... m/ *men* /m.../).

2 /k/ ... the archiphoneme /t-k/ 'voiceless non-bilabial non-nasal' associated with the neutralisation of the opposition between /t/ and /k/. It is realised by [k]. Where /t-k/ occurs (i.e. before /k/ or /g/: e.g. *that* /... t-k/ *cup* /k.../; *that* /... t-k/ *girl* /g.../), it is opposed to, among

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other distinctive units, /p/ 'voiceless bilabial non-nasal' (as in *stirrup* /... p/ *cup* /k.../; *top* /... p/ *girl* /g.../), /d-g/ 'voiced non-bilabial non-nasal' (as in *good* /... d-g/ *concert* /k.../; *good* /... d-g/ *girl* /g.../), and /n-ŋ/ 'non-bilabial nasal' (as in *ten* /... n-ŋ/ *cups* /k.../; *ten* /... n-ŋ/ *girls* /g.../).

3 /b/ ... the archiphoneme /b-d/ 'voiced non-dorsal non-nasal' associated with the neutralisation of the opposition between /b/ and /d/. It is realised by [b]. Where /b-d/ occurs (i.e. before /p/, /b/ or /m/: e.g. *good* /... b-d/ *pen* /p.../; *good* /... b-d/ *boy* /b.../; *good* /... b-d/ *man* /m.../), it is opposed to, among other distinctive units, /g/ 'voiced dorsal non-nasal' (as in *big* /... g/ *pen* /p.../; *big* /... g/ *boy* /b.../; *big* /... g/ *man* /m.../), and /m-n/ 'non-dorsal nasal' (as in *ten* /... m-n/ *players* /p.../; *ten* /... m-n/ *boys* /b.../; *ten* /... m-n/ *men* /m.../).

4 /g/ ... the archiphoneme /d-g/ 'voiced non-bilabial non-nasal' associated with the neutralisation of the opposition between /d/ and /g/. It is realised by [g]. Where /d-g/ occurs (i.e. before /k/ or /g/: e.g. *good* /... d-g/ *concert* /k.../; *good* /... d-g/ *girl* /g.../), it is opposed to, among other distinctive units, /b/ 'voiced bilabial non-nasal' (as in *pub* /... b/ *concert* /k.../; *glab* /... b/ *girl* /g.../), /t-k/ 'voiceless non-bilabial non-nasal' (as in *that* /... t-k/ *cup* /k.../; *that* /... t-k/ *girl* /g.../), and /n-ŋ/ 'non-bilabial nasal' (as in *ten* /... n-ŋ/ *cups* /k.../; *ten* /... n-ŋ/ *girls* /g.../).

5 /m/ ... the archiphoneme /m-n/ 'non-dorsal nasal' associated with the neutralisation of the opposition between /m/ and /n/. It is realised by [m]. Where /m-n/ occurs (i.e. before /p/, /b/ or /m/: e.g. *ten* /... m-n/ *players* /p.../; *ten* /... m-n/ *boys* /b.../; *ten* /... m-n/ *men* /m.../), it is opposed to, among other distinctive units, /ŋ/ 'dorsal nasal' (as in *strong* /... ŋ/ *men* /m.../), /p-t/ 'voiceless non-dorsal non-nasal' (as in *that* /... p-t/ *pen* /p.../; *that* /... p-t/ *boy* /b.../; *that* /... p-t/ *man* /m.../), and /b-d/ 'voiced non-dorsal non-nasal' (as in *good* /... b-d/ *pen* /p.../; *good* /... b-d/ *boy* /b.../; *good* /... b-d/ *man* /m.../). The archiphoneme /m-n/ 'non-dorsal nasal' is the same archiphoneme as the one that occurs in allegro speech before /f/ or /v/ and is realised by [m̥] (labiodental) as in *comfort* /... m-n f.../ and *anvil* /... m-n v.../.

6 /ŋ/ ... the archiphoneme /n-ŋ/ 'non-bilabial nasal' associated with the neutralisation of the opposition between /n/ and /ŋ/. It is realised by [ŋ]. Where /n-ŋ/ occurs (i.e. before /k/ or /g/: e.g. *ten* /... n-ŋ/ *cups* /k.../; *ten* /... n-ŋ/ *girls* /g.../), it is opposed to, among other distinctive units, /m/ 'bilabial nasal' (as in *slim* /... m/ *cups* /k.../; *slim* /... m/ *girls* /g.../), /t-k/ 'voiceless non-bilabial non-nasal' (as in *that* /... t-k/ *cup* /k.../; *that* /... t-k/ *girl* /g.../), and /d-g/ 'voiced non-bilabial non-nasal' (as in *good* /... d-g/ *concert* /k.../; *good* /... d-g/ *girls* /g.../).

Gimson (1962: 271) gives further examples involving regressive assimilation similar to the type we have looked at above. He mentions, for example, *Don't be late* /... mp b.../ (which functionalists may wish to re-analyse as /... m-n p-t b.../), *He won't come* /... ŋ k.../ (/... n-ŋ k.../), *He found both* /... m b.../ (/... m-n b.../), in which cases, according to functionalists, the resultant distinctive units are archiphonemes (not phonemes).

It will have been seen that, when analysed from the functionalist point of view, the phonological system of allegro speech in English will contain more distinctive units (to the extent that certain archiphonemes are to be added) than are identified in non-allegro speech. Some of these archiphonemes may well occur in non-allegro speech as well. It will have become clear that the functionalists' analyses above are crucially based on the concept of phonological opposition (that of neutralisation being consequent on it) and not on the concept of phonetic similarity.

The particular aspect of the type of regressive assimilation in allegro speech in English we have looked at above has implications at another level of the language. Gimson (1960: 8) gives the examples of *ran quickly* vs *rang quickly*, and *run for* vs *rum for*, and Gimson (1962: 271) adds a few more examples like *right pears* vs *ripe pears*, *like cream* vs *light cream* and *hot manure* vs *hop manure*, etc. In these cases, the members of each pair are shown to be phonetically identical (and consequently phonologically identical as well). Gimson (1960: 8; 1962: 271) says that neutralisation is involved. However, according to functionalists, one has here to do ultimately with 'syncretism' in that there is 'formal confusion without semantic confusion' for both speaker and listener. The formal distinction is obliterated because both *ran* and *rang* happen to have the same signifier /r æ n-ŋ/ [ræŋ] as a result of the neutralisation of the opposition between /n/ and /ŋ/, but the speaker has chosen one of the two words and the listener knows (without, however, being able to tell which) that the speaker *has* chosen one of them. Gimson does not mention syncretism in this connection. He is more interested in indicating how this sort of ambiguity may be resolved when he says (1962: 271): '[to the listener] the sense of an utterance [i.e. which word the speaker has chosen] may be determined by the context'.

The above is intended to be but a specimen treatment, from the functional point of view, of a limited number of allegro forms. No doubt it would be interesting to pursue a similar treatment in the same theoretical framework of many other allegro forms.

## REFERENCES

- Akamatsu, T. (1988) *The Theory of Neutralization and the Archiphoneme in Functional Phonology*, Amsterdam and Philadelphia: John Benjamins.  
 — (1992) *Essentials of Functional Phonology*, Louvain-la-Neuve: Peeters.

#### NEUTRALISATIONS AND ARCHIPHONEMES

- Gimson, A. C. (1960) 'The instability of English alveolar articulations', *Le Maître phonétique* 113: 7–10.
- (1962) *An Introduction to the Pronunciation of English*, 1st edn, London: Edward Arnold. Subsequent editions are 2nd edn (1970), 3rd edn (1980) and 4th edn (1989, revised by S. Ramsaran).
- Jones, D. (1945) 'Some thoughts on the phoneme', *Transactions of the Philological Society* 1944, 119–35.
- (1950) *The Phoneme: Its Nature and Use*, 1st edn, Cambridge: Heffer.
- Kohler, K. J. (1977) *Einführung in die Phonetik des Deutschen*, Berlin: Erich Schmidt.
- Martinet, A. (1965) *La Linguistique synchronique*, Paris: Presses Universitaires de France.
- (1969) 'Réalisation identique de phonèmes différents', *La Linguistique* Vol. 5, No. 2: 127–9.
- (1988) Foreword to T. Akamatsu, *The Theory of Neutralization and the Anti-phoneme in Functional Phonology*, Amsterdam and Philadelphia: John Benjamins, pp. xiii–xv.
- Passy, P. (1906) *Les Sons du français*, 6th edn (1st edn 1887), Association phonétique internationale, Paris: Librairie Firmin-Didot, Société des traités.

## The phonetics of neutralisation: the case of Australian coronals

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### NEUTRALISATION: TRADITIONAL AND CONTEMPORARY VIEWS

In his classic introductory text, J. D. O'Connor (1973: 182) concludes a brief excursion on the topic of neutralisation with a typically laconic but accurate reference to the /p/-/b/ opposition in English. This opposition, he says, 'is neutralized after /s/ where only *what we agree to call /p/* occurs' (my emphasis).

The concept of neutralisation has always been one of the corner stones of phonological theory: two or more closely related sounds which are in contrast in some positions in the structure of a language may be replaced in other positions by an *archiphoneme*, embodying the totality of distinctive features common to the two sounds. However, the phonetic realisation of archiphonemes has, until recently, remained a somewhat under-researched area. Phonologists have traditionally grouped such realisations into discrete categories, whilst not always agreeing as to how many there should be. Trubetzkoy (1939: 71-3) originally listed six types of 'archiphoneme representative'.<sup>1</sup> Both Martinet (1968: 3) and Lass (1984: 49-51), on the other hand, come up with a list of five categories, which do not exactly correspond with each other nor with those of Trubetzkoy. Nevertheless, most phonologists seem to agree that, in the case of bilateral oppositions at least, archiphonemes are realised in one of the following ways:

- 1 One member of the opposition is represented, to the complete exclusion of the others. Which sound actually occurs may be determined 'extrinsically', i.e. by the context. More usually, however, the occurrence is determined 'intrinsically', i.e. it is the so-called 'unmarked' member of the opposition which is represented. This type of neutralisation is exemplified by the 'devoicing' of syllable-final obstruents in languages such as German and Polish.
- 2 Neither member of the opposition is represented; 'ein Mittelding' (an 'in-between' sound) occurs which has features common to both. An

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example of this type would be the realisation of stops after initial /s/ in English, where the most commonly occurring sounds are voiceless but unaspirated – hence we must ‘agree to call them’ /p, t, k/.

- 3 Representatives of both members of the opposition occur, *either* in free variation, as appears to be the case, for example, with the syllable-final voicing opposition in Danish, *or* in complementary distribution, as with the /e/-/ɛ/ distinction in most accents of French.

Such traditional categories are evidently based entirely on auditory impressions. Over recent years, however, a certain amount of interest has been shown in the instrumental investigation of the phonetics of neutralisation. This interest has focused almost exclusively on what are presumed to be examples of the first type of realisation, and specifically on the question of whether neutralisation is complete or only partial. Much of this research has concentrated on the study of final obstruent devoicing in languages such as German, Polish, Russian and Catalan (see e.g. Dinnsen and Charles-Luce 1984; Port and O’Dell 1985; Slowiaczek and Dinnsen 1985) and in many cases has claimed to show that underlying distinctions are preserved acoustically, although usually not perceptually. This has led Dinnsen (1985: 275) to conclude that ‘the standard view of neutralization ... is, unfortunately, without empirical support’, and to suggest that the concept is only viable if phonological theory admits a distinction between perception and production. Dinnsen does not explicitly consider cases of type 2 or 3, however, but only those where the archiphoneme representative has traditionally been described as identical with a realisation of one of the members of the neutralised opposition.

Meanwhile in a number of recent approaches to phonology – in particular lexical phonology – the concept of *underspecification* of segments has been utilised in dealing with (amongst other things) neutralisation and markedness (e.g. Kiparsky 1982; Clements 1985; Avery and Rice 1989). According to this concept, only unpredictable features and feature specifications appear in the underlying (lexical) representation. Predictable features and feature values are supplied by rules – either universal or language-specific. Thus Avery and Rice (1989), for example, suggest that the realisation of /t/ as [ʔ] in English occurs because /t/ is underlyingly unspecified for place of articulation. According to this analysis, /t/ only becomes [t] when the Coronal node of its hierarchical feature structure is ‘filled in’ by a phonetic implementation rule. Similarly Harvey (1991) argues that the characteristic phonological patterning of the glottal stop in languages of northern Australia can best be accounted for by regarding /ʔ/ as ‘the completely unspecified segment’ in these languages.

Underspecification does not, in the view of most phonologists, appear to extend to surface representations: in most descriptions each phonetic realisation is fully specified. Keating (1988), however, has suggested that

this may not be a necessary or even a useful assumption. She gives examples of the ‘transparency’ of phonetically underspecified consonants such as /h/ and /b/, as evidenced by the presence of vowel-to-vowel interactions across them. Keating does not explicitly address the question of neutralisation, but it would seem reasonable to suggest that the notion of phonetic underspecification could be applied to the description of at least one type of archiphoneme representative. Surface forms of type 1 would automatically receive the unmarked value for the feature(s) in question by a ‘fill-in rule’ – presumably [–voice] in the case of German syllable-final devoicing. Realisations of type 3 would receive feature values through context-sensitive rules which assign values either on the basis of structural position or through spreading from neighbouring segments. A ‘position rule’ could, for example, be said to determine the realisation of non-final /ɛ/ in French. Type 2 ‘Mittelding’ realisations, however, would presumably remain underspecified even at the phonetic level, and would be ‘transparent’ with regard to the feature in question. The trajectory between segments on either side would be determined by phonetic rules governing the realisation of those segments, and the intervening underspecified segment would contribute nothing of its own to that trajectory. Under this interpretation, O’Connor’s stops following initial /s/ in English would remain unspecified for [voice], and would allow a smooth transition from [–voice] for the preceding /s/ to [+voice] for the following vowel – an interpretation which would seem to fit the facts of glottal dynamics in English initial clusters.

Subsequently Boyce *et al.* (1991: 225) have questioned Keating’s equation of phonetic *target* with phonetic *specification*, arguing that segments which are unspecified for a given feature may (or must?) nevertheless still have a phonetic target for that feature. On the basis of evidence from lip rounding in intervocalic /t/ and /k/ and from velum lowering in slow articulations of intervocalic /s/, they claim that ‘independent targets for so-called “unspecified” segments exist, although temporal constraints may prevent them from being visible in the acoustic or articulatory signal’. According to this view, the English post-/s/ stops *would* be assigned a characteristic target value for glottal configuration at the phonetic level. Because this target would be intermediate between those required for the surrounding segments, it would only become apparent in the appropriate physiological signal when the articulation of the cluster was slow enough to reveal a ‘steady state’.

Compared with the neutralisation of voicing contrasts, the neutralisation of place-of-articulation oppositions seems to be rather less common in the world’s languages, perhaps because the latter are less often ‘privative’ – i.e. involving the presence or absence of a single feature. Reported cases appear to be almost exclusively instances of type 1 or type 3. There are, for example, cases of vowel-induced neutralisation, such as that cited by Hyman

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(1975: 70f.) from the Cameroon language Feʔfeʔ-Bamileke, where the opposition between /c/ and /k/ is neutralised before /i/, and only a sound corresponding to the former occurs. In some languages place of articulation is neutralised in nasals occurring before oral stops and the former are said to acquire their place feature values from the latter. In Australian languages, place distinctions are frequently neutralised in word-initial and word-final positions, and the resulting archiphoneme realisations have traditionally been described as type 1, that is to say the resulting sound is regarded as equivalent to the realisation of one of the members of the non-neutralised opposition.

IMPRESSIONISTIC DESCRIPTIONS OF AUSTRALIAN CORONALS

Australian phonologies are well known for the richness of their CORONAL distinctions – about half of them have three distinct sets of CORONALS and a further one-third have four (see Busby 1980: 75–8; Hamilton 1989: 1–16). Furthermore, almost every language has a nasal phoneme corresponding to each oral stop and many also have a lateral at every CORONAL place of articulation.<sup>2</sup> The following chart shows a maximal Australian place-of-articulation inventory.

LABIAL	APICAL		LAMINAL		VELAR
	ALVEOLAR	POSTALVEOLAR	DENTAL	ALVEOPALATAL	
p	t	t̠	t̪	c	k

The labels are those traditionally used by Australianists and are not necessarily an accurate reflection of the phonetics – although the phonetically more realistic term ALVEOPALATAL is used in preference to the more widely used PALATAL.<sup>3</sup> Linguists have traditionally grouped together the ALVEOLAR and POSTALVEOLAR sounds on the grounds of their similar phonological behaviour and a presumed common active articulator, the tip of the tongue. They are jointly referred to as APICALS, and can probably be traced back to a common proto-Australian order (see Dixon 1980: 155–6). For the same reason, DENTAL and ALVEOPALATAL sounds are grouped together phonologically as a natural class. They are usually referred to as LAMINALS, since they can be said to be articulated with the blade of the tongue.<sup>4</sup>

About a quarter of the languages in Busby’s (1980) survey have a LAMINAL distinction but lack an APICAL distinction (most of these are found in the Cape York Peninsula). Just over 20 per cent have an APICAL contrast with no LAMINAL contrast (this type of system is found in many languages of Western Australia and the Northern Territory). A few languages (16 per cent of Busby’s sample – mainly from eastern Queensland and eastern New South

Wales) have neither a LAMINAL nor an APICAL distinction. In the following sections, the term 'archiphoneme' is used in a very broad sense, to refer to non-contrastive APICAL and LAMINAL sounds, whether they occur in languages which lack the contrast altogether or whether they occur in positions of neutralisation in languages which do have the opposition in question.

There seems to be a general consensus that in 'double-APICAL' languages (i.e. where there is a contrast between ALVEOLAR and POSTALVEOLAR sounds) the former are articulated in a similar way to the equivalent sounds in English (see e.g. Dixon (1980: 135) – although which particular variety of English is seldom specified). This is explicitly stated to be the case in practical pronunciation guides for a number of widely scattered languages, from Adnyamathanha in the south (McEntee and McKenzie 1992: vi) to Gupapuyngu in the north (Lowe 1975: 4,15). At least two (unrelated) languages, however, are described as having somewhat more advanced ALVEOLAR articulations than are usual in English: both Gooniyandi (McGregor 1990: 51) and Kunwinjku (Carroll 1976: 11) are said to have ALVEOLAR sounds made just behind the top teeth.

Most Australianists appear to agree with Dixon (1980: 135) that the POSTALVEOLAR sounds are articulated with the tip of the tongue just behind the alveolar ridge. This is said to be the case, for example, in Western Arrernte (Strehlow 1942: 35), Murrinh-Patha (Street and Mollinjin 1981:196), Tiwi (Osborne 1974: 12), Yindjibarndi (Wordick 1982: 12), and many others. Some authors, however, make reference to a much more retracted point of constriction, often with contact being made by the underside of the tongue blade. Such sublaminal retroflex articulations are said to occur, for example in Adnyamathanha (McEntee and McKenzie 1992: vii), Djingulu (Chadwick 1975: 3), and Gupapuyngu (Lowe 1975: 5, 20).

There appears to be a good deal of variation also in the realisation of DENTAL sounds, both across languages which have this category and often also within them. The majority of 'double-LAMINAL' languages (i.e. those which contrast DENTAL and ALVEOPALATAL sounds) are described as having an articulation with the tongue tip protruding between the teeth or contacting the rims of the upper incisors. Once again the geographical spread of these languages is quite wide, including Wembawemba in the south-east (Hercus 1969: 17), the Arandic languages in the centre (e.g. Yallop 1977: 21) and Kayardild in the north (Evans 1985: 495). The key point emerging from descriptions of these languages is that the pronunciation of DENTAL sounds is normally with the tongue tip up, varying between lamino-interdental and lamino-dentialeveolar, either from speaker to speaker or as a function of speech style and tempo. In a few double-LAMINAL languages, however, as Dixon points out, the tongue tip is said to be placed behind the lower front teeth in producing these sounds. This type of

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articulation is described for Gooniyandi (McGregor 1990: 51) and Yindjibarndi (Wordick 1982: 12) in the west, but also for Wangkumara in the centre (McDonald and Wurm 1979: 8) and for Yuwaalarraay in the east (Williams 1980: 6). There are just a few examples of variation between tip-up and tip-down articulations within the same language. This is said to be the case in Djapu (Morphy 1983: 17) and possibly Marrithiyel (Green 1989: 19).

In the vast majority of cases, ALVEOPALATAL sounds in double-LAMINAL languages are explicitly described as having tip-down articulations, either lamino-postalveolar or lamino-prepalatal. A typical description is that provided by Hercus (1969: 17) for Wembawemba, where 'the tip of the tongue touches the back of the lower teeth, while the blade of the tongue forms an occlusion with the upper teeth ridge and the palatal area immediately behind and above the teeth ridge'. The same kind of articulation is described for other unrelated languages such as Gupapuyngu (Lowe 1975: 7, 17) in the north and Yindjibarndi (Wordick 1982: 12) in the west.

As we have seen, Australian phonologies are characterised not only by the richness of their systems of place contrasts, but also by the fact that these systems can be described in traditional terms as consisting entirely of bilateral and (at least in the case of the CORONALS) privative oppositions. It is, therefore, perhaps not surprising that neutralisation of these oppositions is very widespread. Even when one or both of the CORONAL contrasts is present in a language, its distribution is usually quite restricted. APICAL sounds do not occur very commonly in word-initial position in Australian languages (see Dixon 1980: 167) and in the majority of cases the distinction between ALVEOLAR and POSTALVEOLAR sounds is not maintained in that environment. Reports on the majority of languages state that it is a sound equivalent to the POSTALVEOLAR which occurs in this position. This is said to be the case, for instance, in Nyangumarta (O'Grady 1963: 5), Warlpiri (Jagst 1975: 22), and Kunwinjku (Evans n.d.: 18). In a few languages, however, it is the ALVEOLAR sound which appears to represent the APICAL archiphoneme. Such is said to be the case in Murrinh-Patha, for example, (Street and Mollinjin 1981: 196) and in Kitja (Taylor and Taylor 1971: 107). At least one writer (Wilkins 1989: 91) seems to imply that in Eastern Arrernte there is free variation between alveolar and postalveolar articulations, corresponding to a type 3 realisation of the archiphoneme.

Most double-LAMINAL languages do not maintain the opposition between DENTALS and ALVEOPALATALS in final position and many languages in any case have only a single LAMINAL category. The sound which is most commonly described as occurring in such cases is some kind of tip-down lamino-postalveolar articulation, which would appear to be indistinguishable from those of contrasting ALVEOPALATALS in most double-LAMINAL languages. Such is reported to be the case, for example, in Maung in the north (Capell and

Hinch 1970: 18), Yidiny (Dixon 1977: 32) and Dyirbal (Dixon 1983: 441) in the east and Ungarinjin in the west (Rumsey 1982: 3). Very few single-LAMINAL languages seem to have a tip-up *dental* type of articulation, but the atypical Western Torres Strait language appears to be one of these (Bani and Klokeid 1972: 178; Kennedy 1981: 113). Single-LAMINAL languages are, however, commonly reported as exhibiting allophonic variation between 'more dental' and 'more palatal' varieties of tip-down LAMINAL, with the realisation which is considered to be the predominant or 'major' allophone varying from language to language or even from dialect to dialect. Vowel environment is most usually cited as the determining factor in such variation, as, for example, in many dialects of the Western Desert Language (Douglas 1964: 10; Glass and Hackett 1970: 109–10; Goddard 1983: 23), whereby dental variants occur before /a/ and /u/ and alveopalatal variants occur before /i/. There is also dialectal variation, with the dental articulation being preferred in the west and the alveopalatal in the east. Similar variation is reported amongst the languages of north-east Queensland (Dixon 1983:441) and within the Kunwinjku-Mayali dialects of north-central Arnhem Land (Evans n.d.: 18).

Thus linguists appear to be in agreement that neutralisation of the Australian CORONAL contrasts, in those languages where it occurs, is complete. Moreover there is almost universal acceptance of the type 1 nature of the realisation of both of the CORONAL archiphonemes. The evidence of auditory impressionistic descriptions suggests that it is the more posteriorly articulated member of each opposition which most commonly represents the archiphoneme. This has led Laughren (1990a, b) to propose that it is the [-anterior] member of the opposition in each case which is 'unmarked'. Dixon (1980: 188), on the other hand, regards the ALVEOLAR as being the unmarked member of the APICAL opposition, whilst not denying the apparent frequency of the POSTALVEOLAR at positions of neutralisation, which he explains in terms of a preference for marked segments in initial position.

In the following section, I present some palatographic data with the aim of testing the above assumptions from an articulatory point of view. These data may also have some bearing on the question as to whether such neutralisations can appropriately be accounted for in terms of underspecification. If Australian CORONAL archiphonemes are phonologically unspecified for the feature [anterior], are they phonetically realised as the equivalent of the 'unmarked' member of the opposition (type 1)? Or are they realised as a phonetic 'Mittelding' (type 2) or do they have a realisation which is either freely variable or positionally determined (type 3)? Finally, if either of the latter types is found, are such segments phonetically 'transparent' as regards anteriority or do they nevertheless have a specific target value for the corresponding phonetic parameter?

## PALATOGRAPHIC DATA ON AUSTRALIAN CORONALS

The articulatory data presented here were recorded in the course of a wide-ranging investigation of the phonetics of Australian languages (see Butcher forthcoming). There appear to have been only two previous instrumental articulatory studies, on individual languages (see Jernudd 1974; Proffit and McGlone 1975). For the purposes of the present study, direct palatography was carried out using much the same method as that described by Jernudd (1974: 84) and Ladefoged and Traill (1980: 37ff.). An almost black contrast medium was painted on to the top surface of the speaker's tongue. He or she then pronounced the word under investigation once only. A flash photograph of the speaker's palate was then taken, using a *Polaroid CU-5* close-up camera with a 3 inch lens and a 1:1 palatal reflector, which was inserted into the speaker's mouth. In the case of certain APICAL articulations, where no contact was found at the front of the mouth, the underside of the tongue was then coated with the contrast medium and the procedure was repeated. This usually resulted in a deposit of the medium behind the alveolar ridge, indicating that contact had been *sublaminal*. In such cases tracings from both photographs were subsequently combined to give a composite palatogram of the sound in question.<sup>5</sup> Linguagrams were made by coating the hard palate with the contrast medium and photographing the tongue frontally, using a 1:1 anterior extension against the speaker's chin. All the palatograms reproduced here are traced directly from such photographs and all the cross-sectional profiles are traced directly from alginate palatal impressions of the speaker. Palatograms and accompanying sagittal cross-sections are divided into zones according to the speaker's maxillary dentition, as shown in Figure 2.1. The zoning and labelling are almost identical to those proposed by Firth (1957: 151). This method of division has the advantage of being based on objective criteria and seems to tally well with traditional landmarks when transferred to the mid-sagittal profile (cf. e.g. Catford 1977: 143; Ladefoged and Maddieson 1986: 4). In particular, the border between the alveolar and postalveolar zones, as defined by the dentition, usually falls at the variously named 'edge', 'corner' or 'peak' of the alveolar ridge, in so far as one is discernible from the mid-sagittal profile. Also, the border between the hard palate and the velum at the midline (usually clearly visible on at least some of the photographs) almost always falls exactly on the line between the middle and back molars (7 and 8). Contact between tongue and palate on the sagittal cross-sections is marked according to the location of contact at the midline on the corresponding palatogram. The outline of the rest of the tongue (i.e. the part not in contact with the palate), however, is no more than a reasonable estimation of the shape of the tongue along the midline at the moment of maximum constriction, based on anatomical knowledge, phonetic experience and common sense.

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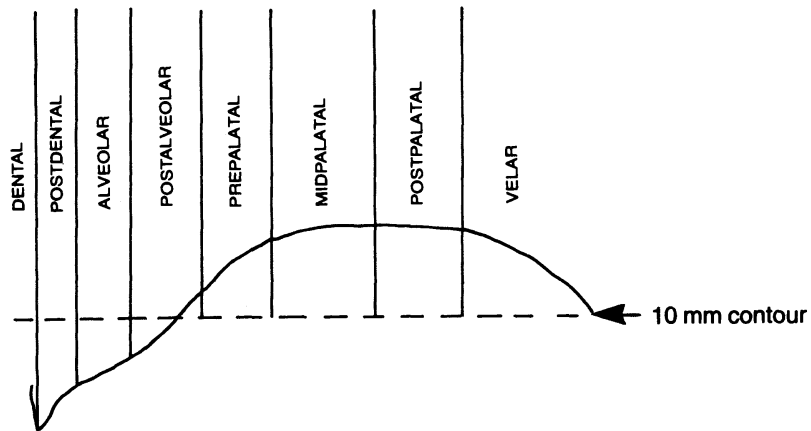
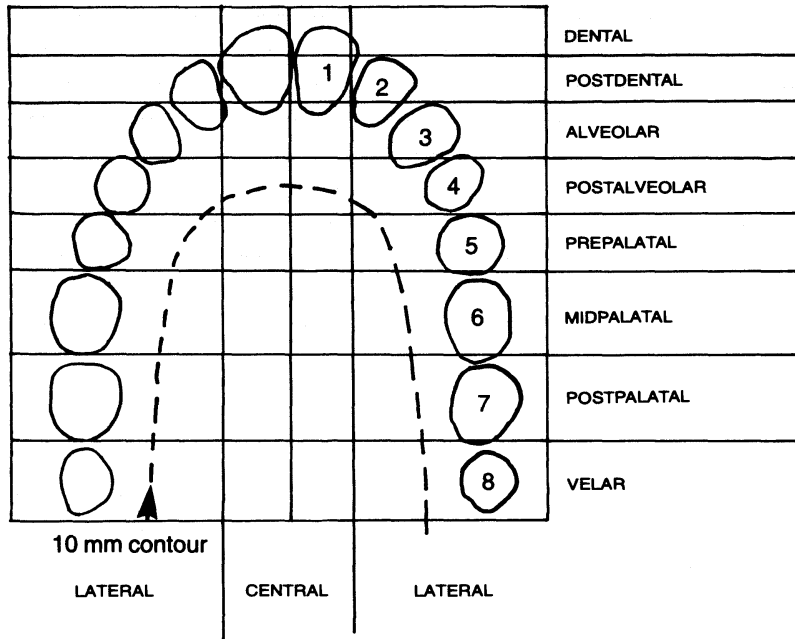


Figure 2.1 Anatomically defined tectal zones used in describing the location of tongue contact on palatograms

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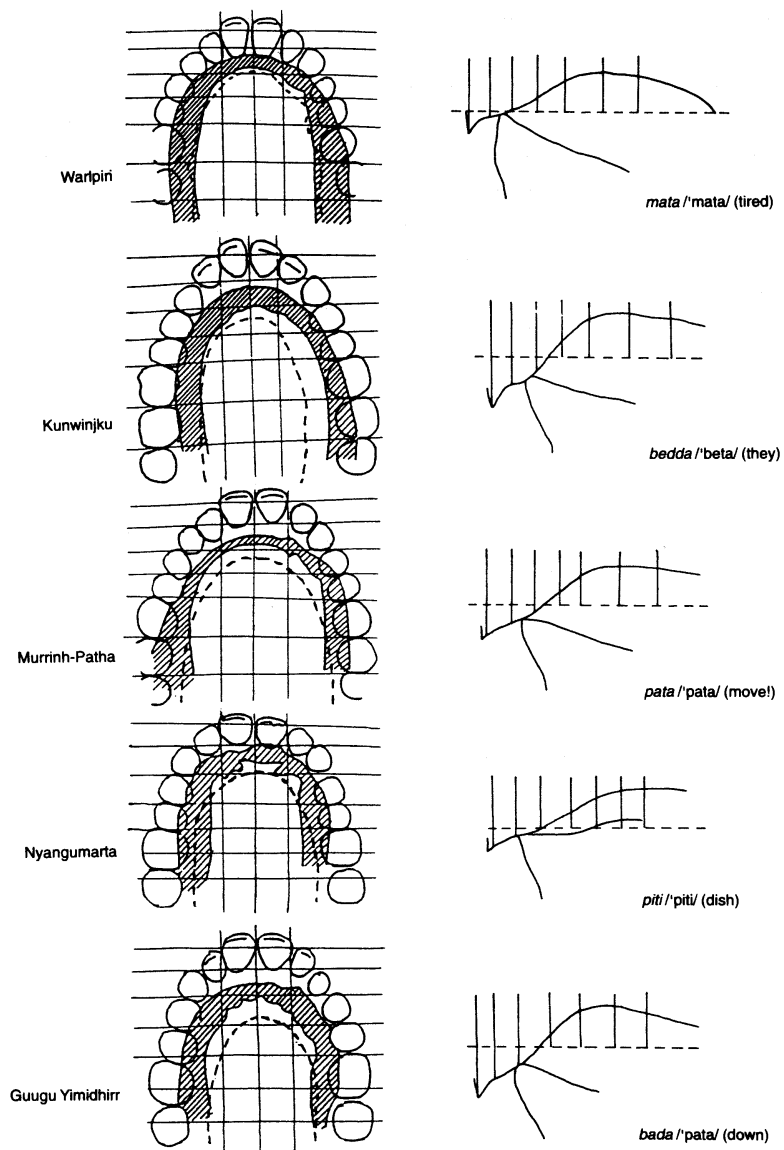


Figure 2.2 Palatograms and sagittal cross-sections of ALVEOLAR articulations in five double-APICAL languages

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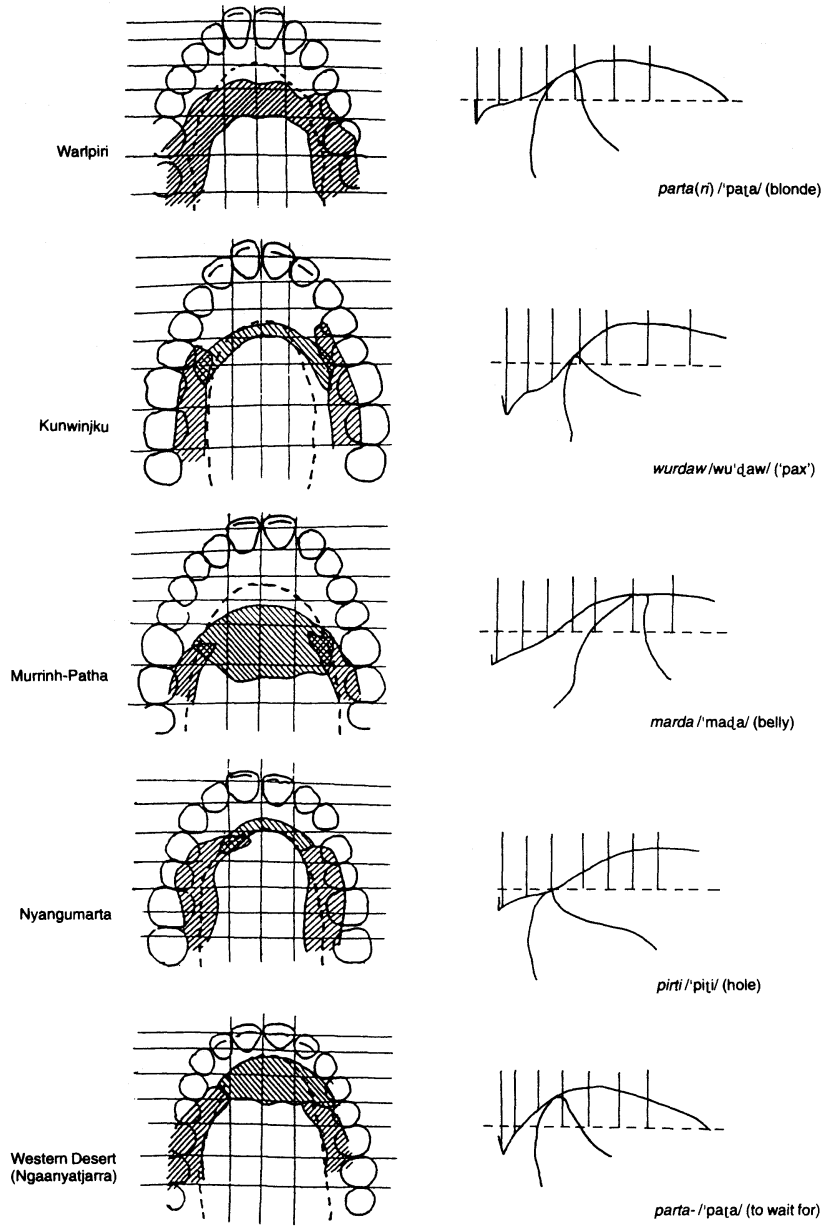


Figure 2.3 Palatograms and sagittal cross-sections of POSTALVEOLAR articulations in five double-APICAL languages

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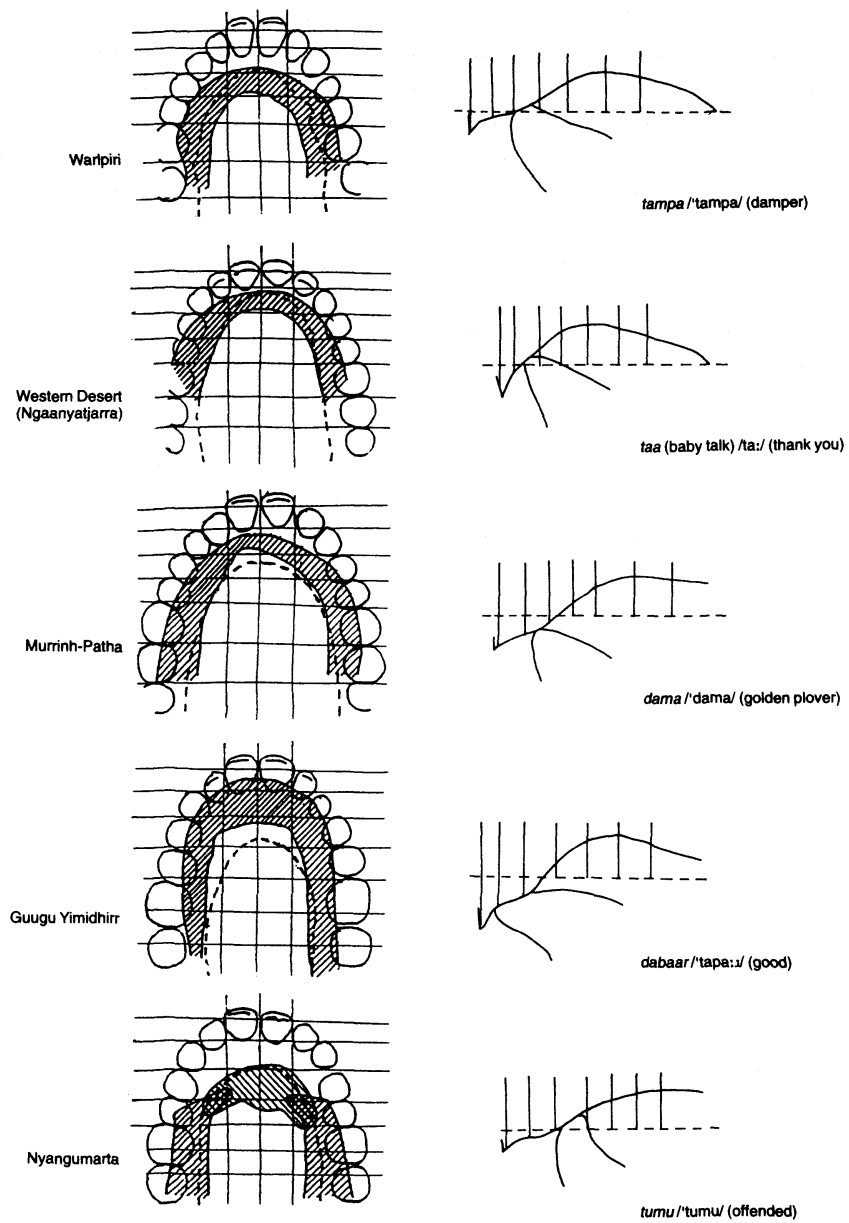
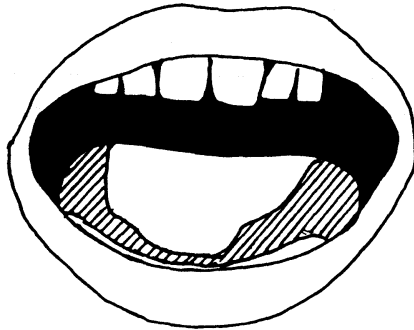
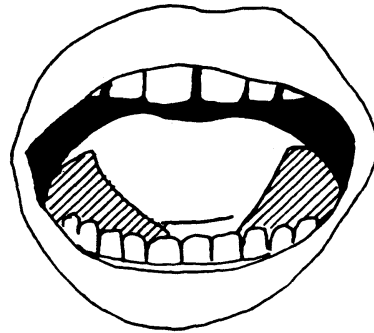


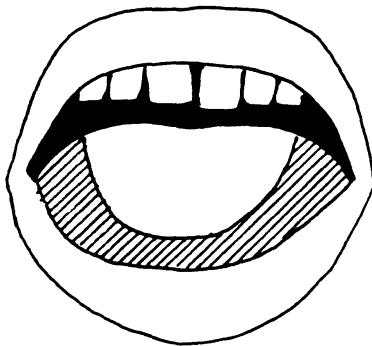
Figure 2.4 Palatograms and sagittal cross-sections of non-contrastive initial APICAL articulations in five double-APICAL languages



(a) *pata-* /'pata/ (to drop)



(b) *parta-* /paṭa/ (to wait for)



(c) *taa* (baby talk) /ta:/ (thank you)

*Figure 2.5* Linguagrams of intervocalic (contrastive) ALVEOLAR and POSTALVEOLAR articulations and an initial (non-contrastive) APICAL articulation by one speaker of the Western Desert Language (Ngaanyatjarra dialect)

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In those languages, and in those contexts, where an APICAL contrast is made (i.e. between ALVEOLAR and POSTALVEOLAR sounds), static palatographic data from the present study show the ALVEOLAR sounds to be articulated in a quite similar fashion by almost all speakers. Figure 2.2 illustrates the way these sounds are produced in intervocalic position by speakers of five different double-APICAL languages. There is usually quite a narrow band of contact at the alveolar ridge, close behind the upper front teeth. This contact extends back along the midline of the palate to a depth of only 2–7 mm, sometimes intruding slightly into the postalveolar zone, and continues around the rim of the palate, usually broadening out to overlap the teeth at the sides. Both the narrowness of the contact and also the evidence from linguagrams indicate that the active articulator for all these speakers must be the tip of the tongue. Figure 2.5a shows a typical ALVEOLAR linguagram in which it can be seen that only the very tip and rim of the tongue have been in contact with the palate. Canonical APICAL ALVEOLARS thus appear to be truly both apical and alveolar in their phonetic realisation.

For the POSTALVEOLAR sounds static palatograms show contact in a broader band, typically in the range of 5–12 mm in depth, but occasionally up to 20 mm or more. Contact is usually centred at least as far back as the first pre-molars, and is thus in the postalveolar or prepalatal zone. Figure 2.3 illustrates these articulations. Contact patterns are much less uniform than in the case of the ALVEOLARS. Palatograms of successive repetitions of the same word in which the upper and lower surfaces of the tongue were each in turn coated with contrast medium clearly show that the active articulator is almost always the underside of the tongue blade (see Figure 2.5b). In fact, every speaker has a sublaminal articulation for every POSTALVEOLAR allophone almost all of the time. Whilst this generalisation is valid for the careful pronunciation of isolated words, it is quite possible that in spontaneous connected speech the tongue tip is more often used.

Contact bands vary in depth from 5 mm in the case of the Kunwinjku and Nyangumarta speakers to 21 mm in the case of the Murrinh-Patha speaker. Most of the sublaminal contact traces are smeared and plainly the result of movement of the articulators (a conclusion which is clearly confirmed by electropalatographic data from a subset of speakers – see Butcher forthcoming). The Nyangumarta speaker has contact only in the alveolar zone; the Kunwinjku and Ngaanyatjarra speakers have contact mainly in the postalveolar zone; the Warlpiri speaker has contact centred in the prepalatal zone; and the Murrinh-Patha speaker has contact extending at least as far back as the mid-palatal zone. It is not possible to determine precisely how much of this variation is language-specific and how much represents differences between speakers. However, what little data there is on within-language variation, in Kunwinjku (Jernudd 1974) and Warlpiri (Butcher forthcoming) indicate that differences between speakers of the same

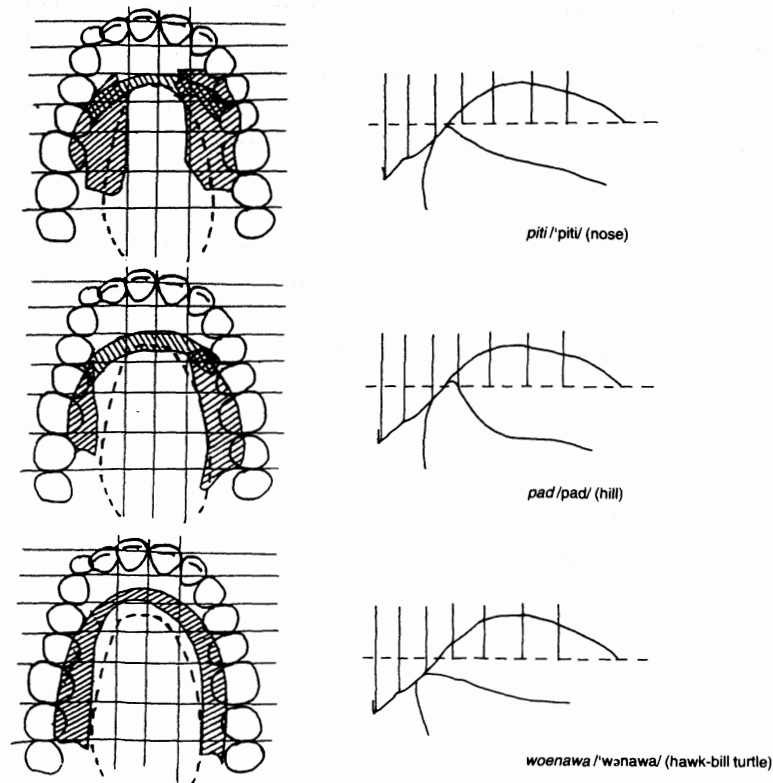
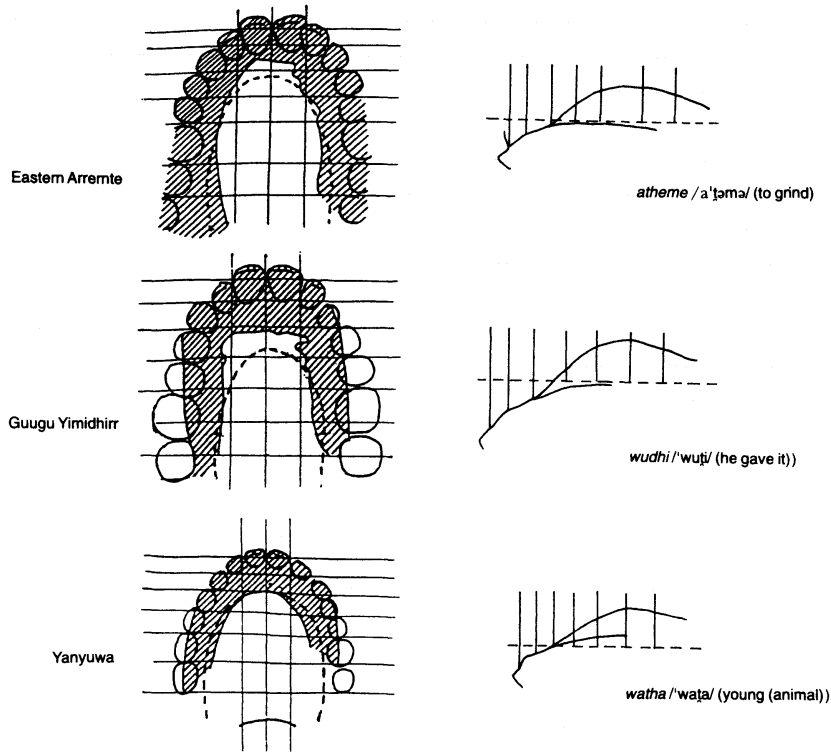


Figure 2.6 Palatograms and sagittal cross-sections of APICAL articulations in various environments in a single-APICAL language – the Western Torres Strait Language (Kalaw Kawaw Ya dialect)

language may be of a similar order of magnitude to those revealed here.

None of the languages illustrated above has an opposition between ALVEOLAR and POSTALVEOLAR sounds in word-initial position. It appears that, despite the auditory impressionistic evidence from the literature, in all of these languages the neutralised APICAL category found in this position has a realisation of type 2 – a ‘Mittelding’ articulation somewhere between those of the two members of the (un-neutralised) opposition. As Figure 2.4 illustrates, this results in a contact band of comparable depth to that found for the POSTALVEOLARS (5–12 mm) but located somewhat further forward – often on the borderline between alveolar and postalveolar zones. There is indeed greater variation in these articulations, but they are only occasionally sublaminar – particularly in the case of the Murrinh-Patha and Nyangumarta speakers. Note the striking difference between the Nyangumarta and Guugu Yimidhirr palatograms. The Guugu Yimidhirr speaker

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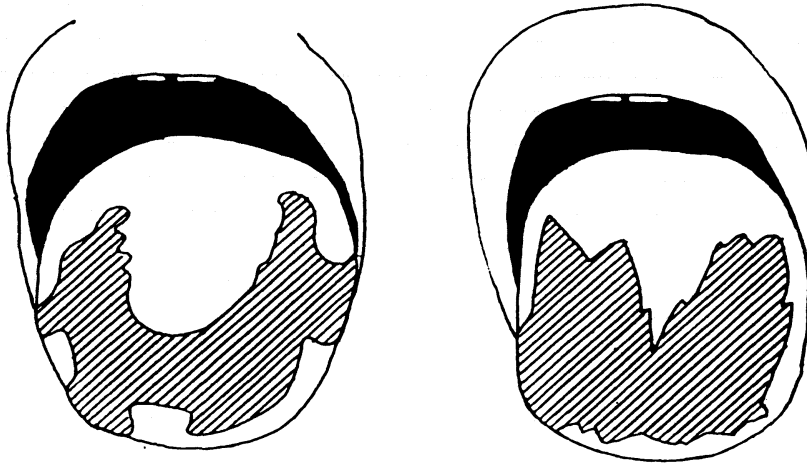


*Figure 2.7* Palatograms and sagittal cross-sections of DENTAL articulations in three double-LAMINAL languages

appears to have a slightly laminal articulation for these sounds (it is nevertheless quite different from either the intervocalic laminal dental articulation or the initial neutralised laminal – see Figure 2.10). In general, however, initial APICALS maintain an apical articulation, as illustrated in Figure 2.5, which compares linguagrams of all three APICAL categories as articulated by a speaker of the Ngaanyatjarra dialect of the Western Desert Language.

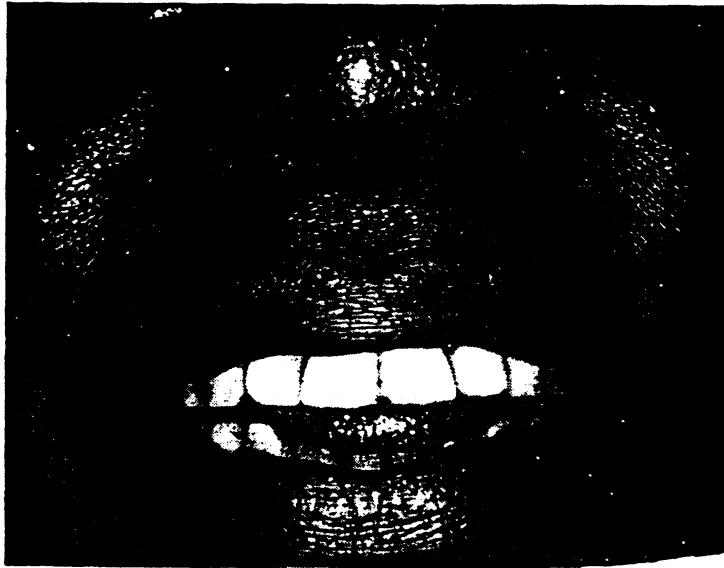
Turning to the one single-APICAL language for which we have palatographic data, Figure 2.6 shows that the constriction for APICAL stops in the Kalaw Kawaw Ya (KKY) dialect of the Western Torres Strait language<sup>6</sup> is formed in the postalveolar zone and more often than not articulated with the underblade of the tongue. Variation, both free and allophonic, appears to be greater than in double-APICAL languages. Stops appear to be more likely to have sublaminar articulation than nasals, final consonants more than medial ones, and consonants in an /u/ environment more than consonants in an /i/ environment.

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(a) *atheme* /a'ʔəmə/ (to grind)

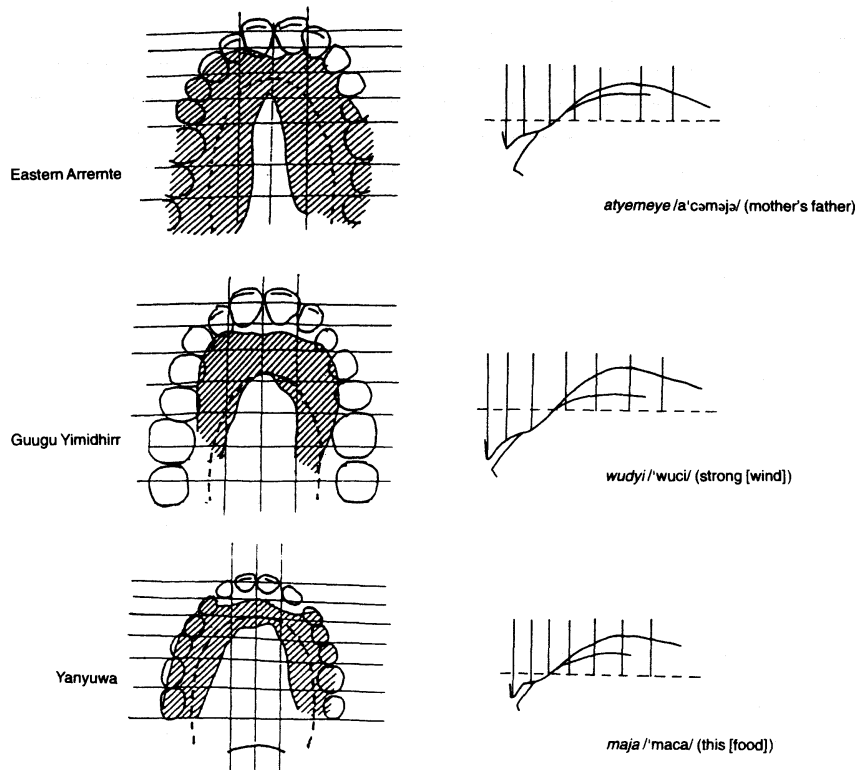
(c) *atyemeye* /a'cəməjə/  
(mother's father)



(b) *atheme* /a'ʔəmə/ (to grind)

*Figure 2.8* Linguagrams of contrastive DENTAL and ALVEOPALATAL articulations by one speaker of Eastern Arrernte and frontal photograph of the former

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*Figure 2.9* Palatograms and sagittal cross-sections of ALVEOPALATAL articulations in three double-LAMINAR languages

Realisations of the DENTAL category in the three double-LAMINAR languages for which we have data all seem to involve lamino-dental articulations, with the tongue tip contacting the upper incisors or projecting slightly below them. Figure 2.7 shows static palatographic data from intervocalic tokens of these sounds in the languages concerned. In each case contact was registered on the very edge of the incisors and extends back between 13 and 20 mm to cover most, if not all, of the alveolar zone. The band of contact is thus about twice the depth of that found for APICAL ALVEOLARS, and is continued with a similar thickness around the sides of the palate, covering most of the teeth. Comparison of the palatograms with the sagittal cross-sections would suggest that, in order to achieve contact in just this area, without touching further back on the palate, the tongue must lie fairly flat in the mouth. The linguagram of an Arrernte DENTAL articulation illustrated in Figure 2.8a shows that contact on the tongue is made some 20 mm back along the midline – i.e. exactly on the area Australianists would