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# The Phonetic Representation of Disordered Speech

ICPD (Pho)

Final Report of PRDS Working Party

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# The Phonetic Representation of Disordered Speech

Final Report of PRDS Project Working Party

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The project was originally launched with a small grant from the Development & Appeals Committee of the College of Speech Therapists. We are indebted to them for this initial sponsorship and for their continuing interest in our work. We are also conscious of the major contributions to our work which have been made by practising (and student) speech therapists, in responding to our formal questionnaires and our informal requests for information or access to patients, and in accepting our invitation (or challenge?) to sample the questionable pleasures,(but guaranteed benefits!), of our phonetics refresher courses. We are therefore pleased to take this opportunity to express our gratitude to our clinician colleagues for their support, encouragement and forbearance. We hope they will find the results as useful in application as we found them interesting in preparation.

Finally, as the organiser of the project's meetings and recorder of our proceedings, I wish to thank all members of the PRDS group who contributed to our work, for their enthusiastic participation, friendly cooperation and practical advice and help in the running of the project.

Pam Grunwell
Leicester Polytechnic
October 1982

# PHONETIC REPRESENTATION OF DISORDERED SPEECH

## Introduction

In July 1977, a conference of lecturers in phonetics and linguistics involved in the training of speech therapists was held at Castle Priory College, Wallingford. Lecturers in speech pathology and therapy also participated in the meeting. The primary aim of the conference was to discuss the aims, content and scope of linguistic sciences syllabuses in speech pathology and therapy courses. As part of the discussions practical phonetic teaching and its clinical applications were considered. With regard to the latter, for all those present it was no surprise to find that there was unanimous agreement with regard to certain types of difficulties encountered in applying existing conventions for phonetic notation in the clinical context.

It is widely recognized both by phoneticians who have studied clinical data and by clinicians themselves that the phonetic alphabet recommended in the syllabus of the Diploma of the College of Speech Therapists (The International Phonetic Alphabet) is inadequate in certain respects for the transcription of both disordered speech and the normal, but immature, articulation of young children. It must of course be acknowledged that the IPA is intended to be used for normal adult speech and that the phonetically deviant phenomena found in disordered speech were not considered in devising the system. The IPA nevertheless does have considerable potential if its complete range of symbols and diacritics are exploited to the full; a point demonstrated in a somewhat neglected paper by Trim(1953), whose theme is taken up by Susan Ramsaran in Chapter 2. There are still however aspects of disordered speech which are not catered for in the International Phonetic Alphabet.

It was discovered that the individual solutions to this common problem varied considerably in that clinical phoneticians devised their own idiosyncratic transcriptional devices to represent the phenomena of disordered speech. It should be pointed out that some transcriptional systems specifically devised for the representation of abnormal varieties of speech were already in existence(e.g. Bush et al 1973; see also Ingram 1976 p.93). Most participants at the conference who were familiar

with these had not found them entirely satisfactory. It was therefore suggested that a working party should be set up to investigate the phonetic representation(i.e. transcription) of disordered speech.

The majority of the members of the working party are phoneticians, most of whom have been involved in the training of speech therapists. Several members have had considerable clinical experience; some of the members are qualified speech therapists, with a particular interest in phonetics and the problems of representing disordered speech,(see p. for a list of members of the PRDS project group). The project was set up with the following aims :

- to identify and specify in detail the transcriptional needs of those applying phonetic representation in the analysis of disordered speech
- to devise transcriptional conventions for the phonetic representation of disordered speech
- to publicise the recommended conventions in appropriate ways in order to attempt to standardise usage, at least in Britain.

The project was thus envisaged as having investigatory, regulatory and educational purposes.

In order to fulfil the first of these purposes, the needs of practising clinicians were investigated by questionnaires which were sent to a large sample of speech therapists during late 1978 and early 1979. There was a good response to these questionnaires and these provided the members of the project with a wide variety of interesting and helpful information about the current practices and identified requirements of the working therapist. The questionnaires and their results are discussed in detail by Pam Grunwell in Chapter 3.

There was evidently quite a keen interest in the project amongst practising clinicians and several respondents commented on the need for regular re-training of practical phonetic skills; both of which findings greatly encouraged the working party to continue with the project according to the original plan. From the responses to the questionnaires it was evident that many clinicians were not fully aware of the potential

resources of the existing system of representation(IPA); Susan Ramsaran's contribution to this report is therefore intended to satisfy this identified need (Chapter 2).

An appreciable number of respondents made specific requests for standardised conventions for the representation of particular aspects of disordered speech; several respondents provided suggestions for symbols of their own devising for unrepresented types of speech deviations. These requests and suggestions together with the experience of the members of the working party were the substance of the discussions at the project meetings during 1979 and 1980. In order to focus the discussion on specific issues, tape recordings of speakers with different types of speech disorders were analysed. The types of disorders considered included :

acquired dyspraxia
acquired dysarthria(various sub-types)
developmental phonological disorders
developmental speech disorders associated with hearing impairment.

Various solutions to the problems of representation were proposed and discussed at length. Eventually a set of symbols and diacritics were agreed which were to be recommended as supplementary to and to be used in conjunction with the International Phonetic Alphabet for the representation of disordered speech. These Recommended Additional Phonetic Symbols were published in the 1980 Progress Report of the project (PRDS Group 1980). It should be noted that there have since been some minor, but significant, revisions to these. The revised and final set of Recommended Additional Phonetic Symbols is discussed in detail in Chapter 3.

As well as considering the representation of the segmental aspects of disordered speeech the working party also devoted several of its meetings to discussing suprasegmental aspects. For one of the sessions on this topic Professor David Crystal joined the group and made a most valuable contribution to its deliberations. It was found that the prosodic notation devised by Crystal(Crystal 1969; Crystal & Davy 1969 p.39) provided an applicable and useful representation of disordered speech. In this application it must be noted however that the descriptive framework is not being used as originally proposed, which was an analysis of the phonological contrasts in the intonation and prosodic systems of normal British English speech. For the representation of disordered speech the framework is being used as if it were an analysis of the

phonetic dimensions present in the suprasegmental aspects of the speech. On the basis of its investigations in this area the working party therefore recommends that the system proposed by Crystal(op.cit.) is appropriate for the representation of the prosodic aspects of disordered speech.

The working party also considered undertaking a more revolutionary and fundamental revision of the system of prosodic representation. After preliminary discussions it emerged that if this line of investigation were pursued the project would for the most part be duplicating the MRC Project conducted by Dr. John Laver and associates in Edinburgh,(see Laver 1980 for the type of approach adopted in the Vocal Profile Analysis developed in the project). The PRDS project group therefore decided not to continue its investigation of these aspects of disordered speech.

Even while the discussion of the Recommended Additional Phonetic Symbols was still going on within the working party, the third aim of the project was already beginning to be realised. Many members of the group were, and still are, involved in the initial education and training of speech therapists; the teaching of practical phonetics on degree and diploma courses thus provided opportunities to pilot the new symbols and diacritics. In addition, members of the group were often invited to contribute to the in-service training of qualified speech therapists, and where appropriate, the additional symbols were introduced to participants on these courses. With the publication of the Progress Report at the end of 1980, it was decided that members of the working party should attempt to mount specific courses in the phonetic representation of disordered speech. Since that time several in-service study days or courses have featured one or more 'phonetics refresher sessions' run by members of the PRDS project. These activities have been conducted primarily by Evelyn Abberton and John Wells in London; Pam Grunwell in London and elsewhere; Ron Beresford in North-East England; Mike MacMahon in Scotland.

In September 1981 the PRDS project ran its own one-day Workshop on the Phonetic Representation of Disordered Speech at the King's Fund Centre in London. The Workshop was attended by 29 practising clinicians and staffed by 5 members of the working party acting both as lecturers and tutors. The programme of the Workshop met with considerable success and the practical activities based on the lectures and a specially prepared demonstration videotape were well-received. It is from the mate-

rials prepared for this Workshop and the experience in and feedback from teaching, in particular, on in-service courses in the phonetic representation of disordered speech, that this Report-cum-Teaching Pack has been developed. This publication is intended to fulfil the third, educational, aim of the project and to provide the means whereby the Recommended Additional Phonetic Symbols can be publicised and their usage standardised.

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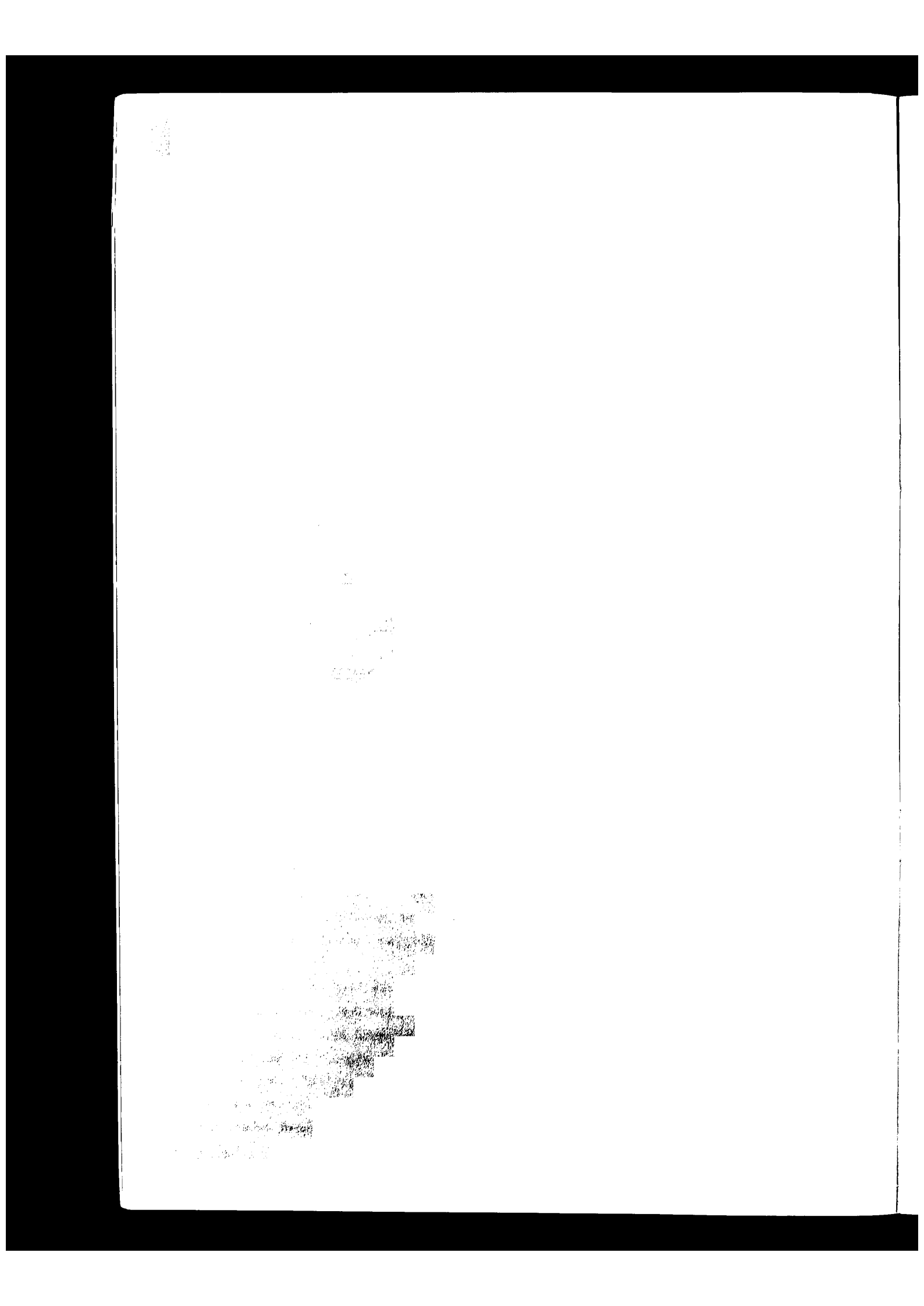

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## Exploiting the International Phonetic Alphabet

by Susan Ramsaran, University College London

No serious phonetician is going to suggest that phonetics is a list of symbols or that all a speech therapist needs to do in order to carry out a clinical analysis of disordered speech is to transcribe the sounds a patient makes.

However, in the course of diagnosis, a clinician often needs to transcribe at least some features of a patient's speech -- especially in the preliminary stages of analysis. It was to help with that part of the work in the clinic (and with referrals among therapists) that we were asked to examine the phonetic representation of disordered speech. The International Phonetic Alphabet should be a major tool here. Since it was devised to deal with the normal production of the world's languages, in certain respects it is inadequate for transcribing disordered speech; but it should provide the basis for transcribing any speech if we exploit its resources fully -- and that is what I shall try to demonstrate here.

I shall concentrate on the transcription of consonants, as this is usually more important to the speech therapist than the representation of vowels.

No doubt everyone here uses the symbols which represent the most common allophones of the English consonant phonemes, whether a patient uses these with phonological appropriateness or not. (For instance, [θ] correctly represents the /θ/ in thin, but many children also use [θ] at the beginning of sit instead of some variety of /s/ .) Because of certain common phonetic substitutions for the sounds of normal adult speech, most of us will have cause to use [ʊ,ɬ,ʝ,ç]; and then, for instance in cases of dysarthria, we may hear 'weak' articulations where plosives are replaced by homorganic fricatives -- and so we have [ɸ] and [β] in paper and rubber respectively, and [x] and [ɣ] in car and go respectively. If we need to note a glottal stop, that presents no

problems, for instance as in bucket pronounced [bʌʔɪʈ̚]. If we hear something odd in the word England [ɪŋgɰ̟ənd], this may cause a slight hesitation. We hear a voiced continuant, not fricative; then we decide that it's velar and we end up by transcribing it as [ɰ̟] which isn't, after all, as outlandish a sound as the symbol may have suggested.

The real problems start when we hear something that is very like an easily identifiable sound but which differs from it in some irritatingly elusive way. The diacritics shown with the I.P.A. chart enable us to represent many of the variations that one encounters in voice, place and manner.

Voice

The intervocalic consonant in betting is totally voiceless: [bɛtɪŋ],but that in bedding is fully voiced:[bɛdɪŋ]. If a particular utterance has a /t/ but if there is some degree of voicing, this can be shown as [t̬]. Conversely, a devoiced /d/ is shown as [d̥]. Of course everyone knows this and knows that [d̥] could be the normal realisation of /d/ utterance-finally; but we wouldn't normally wory about showing a predictable allophone of normal speech. We might want to show abnormal devoicing -- or voicing -- though. Take the work clean where we would expect the /l/ to be devoiced . If a patient voices it fully, the strictly accurate transcription [klin] may fail to convey this. It might be helpful to make a technically redundant transcription: [k̬lin] which would give the information explicitly.

Aspiration may vary to a degree which one wishes to indicate. It would be possible to distinguish between greater and lesser degrees of aspiration by reserving a full [h] for the greater and a superscript diacritic [ʰ] for the lesser. For example /p/ → [ph] or [pʰ]. Alternatively, the greater degree might be a matter of length of aspiration rather than vigour. In that case it would be within the conventions of the I.P.A. to indicate lengthy aspiration as [pʰː].

Place

When the main place of articulation offers no problem but where a simple [f] or [ð], for instance, does not adequately convey the precise articulation, indicating retraction or advancement might provide a more accurate

transcription. Perhaps [f̪] would convey a /f/ made with the upper incisors contacting the outside surface of the lower lip and [f̲] would represent a /f/ made with the lower lip protruding. [ð̪] would be an interdental slit fricative, [ð] a dental slit fricative and [ð̲] an alveolar slit fricative. The same two diacritics may thus be applied in different cases to convey different details but without causing ambiguity. (Note that [f̪] may also be written [f+]etc.)

Manner

Manner depends on the degree of stricture between two articulators. If a plosive articulation is replaced by a lesser homorganic stricture, a fricative results. Conversely, a fricative will be replaced by its homorganic plosive if the articulators make firmer contact. Thus it is apparent that the diacritics which indicate raised and lowered qualities for vowels may very conveniently represent all variations (for which there are no separate symbols) in manner of consonant articulation . A voiced post-alveolar fricative has a closer tongue position than its homorganic approximant and is therefore shown as [ɹ̞]; a voiced dental approximant has a more open articulation than the fricative and can consequently be shown as [ð̞].

Miscellaneous

As I implied when talking about aspiration, the length mark can be applied to a number of different things. A prolonged (bilabial) nasal may be shown as [mː], a (bilabial) plosive with a markedly long hold phase as [pː], and so on.

The slur mark may well be used with considerable scope. Imagine friction in several places of articulation simultaneously: [f͡sʃ]!

Various other combinations of sound are possible. Following the example [ʃˢ], "a variety of ʃ resembling s", we can indicate any major articulation with a suggestion of something else happening simultaneously. For instance, [ɻᵒ] would be an alveolar or dental click with at least a bilabial gesture being made at the same time.

As far as vowels are concerned, centralisation is possibly the most important feature to note. It is probably necessary to indicate this (for

instance by [ä] or [ɔ̈] ) more frequently than raising or lowering.

I end by taking a few words from the speech of a hearing-impaired child and indicating how quite disordered speech can be transcribed in accordance with the conventions of the I.P.A.

| | |
|---|---|
| duck | [ʔdʌkʼ] |
| apple | [ˈʔæˈpɯ] |
| girl | [ɣ̊ɔː] |
| bucket | [ˈbʌˈʔɪʧ] |
| bus | [bʔʌs̪] |

# THE INTERNATIONAL PHONETIC ALPHABET

(Revised to 1979)

## CONSONANTS (pulmonic air-stream mechanism)

| | *Bilabial* | *Labiodental* | *Dental, Alveolar, or Post-alveolar* | *Retroflex* | *Palato-alveolar* | *Palatal* | *Velar* | *Uvular* | *Labial-Palatal* | *Labial-Velar* | *Pharyngeal* | *Glottal* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Nasal* | m | ɱ | n | ɳ | | ɲ | ŋ | ɴ | | | | |
| *Plosive* | p b | | t d | ʈ ɖ | | c ɟ | k g | q ɢ | | k͡p g͡b | | ʔ |
| *(Median) Fricative* | ɸ β | f v | θ ð s z | ʂ ʐ | ʃ ʒ | ç ʝ | x ɣ | χ ʁ | | ʍ | ħ ʕ | h ɦ |
| *(Median) Approximant* | | ʋ | ɹ | ɻ | | j | ɰ | | ɥ | w | | |
| *Lateral Fricative* | | | ɬ ɮ | | | | | | | | | |
| *Lateral (Approximant)* | | | l | ɭ | | ʎ | | | | | | |
| *Trill* | | | r | | | | | ʀ | | | | |
| *Tap or Flap* | | | ɾ | ɽ | | | | ɢ | | | | |
| *Ejective* | p' | | t' | | | | k' | | | | | |
| *Implosive* | ɓ | | ɗ | | | | ɠ | | | | | |
| *(Median) Click* | ʘ | | ǀ | ǃ | | | | | | | | |
| *Lateral Click* | | | ǁ | | | | | | | | | |

## DIACRITICS

◌̥ Voiceless n̥ d̥
◌̬ Voiced s̬ t̬
◌ʰ Aspirated tʰ
◌̤ Breathy-voiced b̤ a̤
◌̪ Dental t̪
◌̺ Labialized t̺
◌̻ Palatalized t̻
◌ˠ Velarized or Pharyngealized ɫ, l̴
◌̩ Syllabic n̩ ɫ̩
◌͡◌ or ◌‿◌ Simultaneous ʃf (but see also under the heading Affricates)

◌ˑ or ◌. Raised e˒ (= e̝), ɐ˒ (= ɐ̝), β˒ (= β̞)
◌ˎ or ◌, Lowered e, (= e̞), ɹ, (= ɹ̞), ɣ, (= ɣ̞)
◌˖ Advanced u˖ (= ʉ), ɑ˖ (= ɑ̟)
◌˗ or ◌- Retracted i˗ (= i̠), e˗ (= e̠), t˗ (= t̠)
◌̈ Centralized ë
◌̃ Nasalized ã
◌ʴ, ◌ˤ, ◌ᶣ r-coloured aʴ
◌ː Long aː
◌ˑ Half-long aˑ
◌̯ Non-syllabic i̯
◌˃ More rounded ɔ˃
◌˂ Less rounded y˂

## OTHER SYMBOLS

ɕ, ʑ Alveolo-palatal fricatives
ʃ̺, ʒ̺ Palatalized ʃ, ʒ
ɾ Alveolar fricative trill
ɺ Alveolar lateral flap
ʃ͡x Simultaneous ʃ and x
ʃˢ Variety of ʃ resembling s, etc.
ɪ = ɩ
ʊ = ɷ
ɜ = Variety of ə
ɝ = r-coloured ə

## VOWELS

| | *Front* | | *Back* |
|---|---|---|---|
| *Close* | i | ɨ | ɯ |
| | | ɪ | |
| *Half-close* | e | ʏ | |
| | | ə | |
| *Half-open* | ɛ | ʌ | |
| | ɯ̟ | ʊ | |
| *Open* | a | | ɑ |

*Unrounded*

| | *Front* | | *Back* |
|---|---|---|---|
| *Close* | y | ʉ | u |
| | | ʏ | ɷ |
| *Half-close* | ø | | o |
| | | ɵ | |
| *Half-open* | œ | | ɔ |
| | | | |
| *Open* | | ɶ | ɒ |

*Rounded*

## STRESS, TONE (PITCH)

ˈ stress, placed at beginning of stressed syllable: ˌ secondary stress: ˉ high level pitch, high tone: ˍ low level: ˊ high rising: ˏ low rising: ˋ high falling: ˎ low falling: ˆ rise-fall: ˇ fall-rise.

AFFRICATES can be written as digraphs, as ligatures, or with slur marks; thus ts, tʃ, dʒ: t͡s t͡ʃ d͡ʒ: t͡s t͡ʃ d͡ʒ.
c, ɟ may occasionally be used for tʃ, dʒ.

## DEVISING THE RECOMMENDED ADDITIONAL PHONETIC SYMBOLS

Pam Grunwell

The first aim of the PRDS project, as stated in the Introduction to this report was :

- to identify and specify in detail the transcriptional needs of those applying phonetic representation in the analysis of disordered speech.

The achievement of this aim was regarded by the members of the project as a necessary prerequisite to the second aim of devising specific transcriptional conventions. In this chapter which describes these additional conventions it is also appropriate to put the project's recommendations in the context of our findings about transcriptional practices and identified needs. These will therefore be outlined in the first part of this chapter.

All members of the project had experience of attempting to transcribe disordered speech and therefore our discussions drew quite considerably upon the individual and collective observations of members. It was however decided at the outset of the project that it was essential that the outcomes of our work must satisfy the daily notational requirements of the practising clinician, as well as provide a representational framework which would be useful to researchers. In order to investigate the transcriptional practices and needs of speech therapists two questionnaires were distributed during late 1978 and in the first three months of 1979. One questionnaire was compiled by Mike MacMahon and sent out to therapists in the West of Scotland; the 77 responses received were subsequently analysed by Mike MacMahon. The other questionnaire was compiled by Pam Grunwell and sent to twenty Area Health Authorities throughout England and Wales; 142 responses were received to this questionnaire and were analysed by Pam Grunwell, with the assistance of John Connolly.

The two questionnaires had essentially the same format although there were minor differences in wording. The questionnaires were divided into four sections :

1. a copy of the IPA Chart(Revised to 1951) on which therapists were asked to indicate which symbols they :
   - (a) regularly used
   - (b) sometimes used
   - (c) rarely used

2. therapists were asked to describe any sounds for which they thought there ought to an 'officially recognised' symbol

3. therapists were asked to list symbols and describe sounds for which they had devised their own symbols; this section was sub-divided to allow for (a) symbols used instead of IPA symbols and (b) symbols used for sounds without IPA symbols(to the knowledge of the respondent)

4. therapists were asked to indicate - in terms of 'yes/no/perhaps' - whether they thought there was a need for conventions for the representation of variations in :
   Loudness
   Tempo
   Rhythm
   Pitch Range
   Phonation Types.

The responses that were received to both questionnaires were very similar and therefore the findings of the surveys will be reported as a whole. It was evident from the number of returns received and the accompanying comments that there was quite considerable interest in the project; it may of course have been only those therapists who were interested who actually responded. Nevertheless, it was our impression that we had tapped at least one set of widely held views in the profession. While the overall response was thus encouraging it should also be reported that therapists were evidently not as keen as the members of the project to extend the existing notational system. The responses to the supraseg-mental section of the questionnaires(section 4.) were, when taken overall, equivocal, with a large proportion of 'perhaps' replies. As it transpired the project did not develop a representational system for this aspect of disordered speech, though time was spent discussing this problem and a system was investigated and subsequently recommended as appropriate for clinical purposes (see Introduction).

With regard to the current transcriptional practices of the respondents to the questionnaires it was evident that therapists tended to make rather limited use of the existing resources. As was to be expected, the symbols that were regularly used by all respondents were those representing the main allophones of the English consonant phonemes. Other symbols that were regularly used by a majority of therapists included : [ʔ ɬ ɮ c ɕ ʝ

x ʊ ɸ β]. This list constitutes quite a representative selection of thesymbols available from the IPA and includes the 'non-English' sounds that occur quite frequently in some types of disordered speech. An appreciable number of respondents, however, stated that they had forgotten most of the symbols and that they circumvented this by a description of the articulations used. This, it was claimed by some, facilitated inter-therapist communication. The project members, on the other hand, were of the opinion that this was a time- and paper- consuming method by comparison with an alphabetic notation using a relatively small number of mutually understood symbols.

It was especially noticeable that relatively few therapists appeared to make use of diacritics. Many respondents left the discritic section of the IPA chart unmarked. While this was ambiguous with respect to the questions asked, it is probably reasonable to assume that lack of response in most instances indicated virtually complete lack of use. While this finding is understandable given the multitude of calls on a therapist's attention during a clinical session, it is regrettable; the more especially since in the subsequent sections of the questionnaires therapists identified needs, and in some instances had devised symbols, for types of sounds which were already capable of being represented using the resources of the existing system.

With regard to the transcriptional needs for which there are no existing conventions and/or for which the existing conventions need supplementing, the responses to the questionnaires provided project members with many useful ideas. Indeed the working party was stimulated by the number and variety of segmental aspects of speech which therapists collectively identified as requiring representation. Specific requests included : lack of aspiration; nasal friction; weak, strong, silent and very short articulations; labiodental plosives; ingressive fricatives; dental friction(with no lingual articulation); palato-alveolar(and) lateral fricatives; lip-spreading; a 'not sure' convention. In devising the additional phonetic symbols the working party discussed in detail all the requirements of therapists that were identified in the questionnaires and indicated by colleagues and acquaintances. Care was taken to ensure that the commonly encountered requirements, where feasible, were catered for in the project's recommendations.

The set of Recommended Additional Phonetic Symbols(RAPS) that were finally agreed by the members of the PRDS project working party can be found on pages 21 to 23 . It should, by the way, be noted that these are slightly amended from those published in 1980 in the British Journal of Disorders of Communication. In particular : the diacritic representing a weak/lax/ tentative articulation has been changed; a diacritic to represent a blade of tongue articulation has been added; and a section on Secondary Articulations, specifically lip-rounding and lip-spreading, has been inserted. It is relevant also to point out here that after some discussion at an early stage in the project, it was decided to extend the range of conventions available for phonetic representation primarily by introducing new diacritics or new uses for existing diacritics, rather than by devising many new symbols. RAPS are for use together with the International Phonetic Association's alphabet. They have been devised on IPA principles; in this regard the project group greatly benefited from the presence of John Wells, Secretary of the IPA and Editor of the Journal of IPA, among its number. It should be noted, however, that although they are recommended by the PRDS group, the RAPS are not officially recognised by the IPA. Moreover they have been specifically proposed to represent aspects of speech encountered in a clinical context. Be that as it may, as will be shortly discussed, the recommended symbols do not represent phenomena that are exclusively found in disordered speech.

With regard to the RAPS, it must first of all be stated that they are based on the same descriptive framework as that which underlies the traditional alphabetic system of phonetic representation. That is, the symbolisation used is derived from a segmental analysis of the continuous flow of speech movements and the resultant sound. In addition, the descriptions of the segments represented by the RAPS are based on articulatory and auditory observations; the project did not involve any objective measurements, instrumental or acoustic investigations of the phenomena represented. RAPS are divided into sections based upon the traditional phonetic descriptive categories of :

A. Place of Articulation
B. Manner of Articulation
C. Voice (or Phonatory Aspects)
D. Air Stream
F. Secondary Articulation

There is also a section which deals with another aspect of articulation

that has always been considered in regard to normal speech :

E. Duration, Coarticulation and Pausing.

In addition, there is a category which is essential for clinical work but which is not considered appropriate for other applications of phonetic representation :

G. Relating to inadequacy of data or transcriptional confidence.

The speech of very young children and of disordered speakers of any age often presents the phonetician/clinician with apparently insoluble problems on the not infrequent occasions when it is extremely difficult to analyse what the articulatory configuration and/or movements might be that are producing a particular type of sound. A 'not sure' convention is therefore a very useful tool when one is unable to specify fully any particular segment(s).

As indicated above, however, it is by no means the case that all aspects of speech covered by the RAPS are only ever found in the speech of disordered speakers (of English or any other language). Therefore in concluding this introduction to the additional symbols, the types of segments and further phonetic features represented will be considered from this al ternative point of view. As well as the 'not sure' conventions detailed in Section G., and 33. The Asterisk, there are four other categories of additional conventions for phonetic representation.

1. Conventions filling unresolved gaps in the IPA
   e.g. 7. Voiced Palatal Fricative
   17. Plosive with non-audible release

2. Conventions for representing aspects of speech that are not infrequently encountered in normal speech (i.e. speech sounds that are entirely 'normal'), but which are often found to be characteristic of the speech of disordered speakers or significant in accounting for its deviance, bizarreness or unintelligibility.
   e.g. 3. Labiodental Plosives
   18/21. Variations in voice onset and voice offset time
   26/27 Length diacritics

3. Conventions for representing segments not usually or rarely

encountered in the speech of normal speakers; these are in effect the symbols specifically for the representation of disordered speech.

e.g. 4. Reverse Labiodentals
5. Bidentals
10. Segments with nasal escape
23. Pulmonic Ingressive Air Stream.

4. Convention for 'non-sound', a category which not surprisingly, traditional phonetics has not considered particularly necessary;

i.e. 25. Zero Air Stream.

The facility to represent 'sounds' seen but not heard is however very useful in clinical context, where one may encounter a variety of patients whose disorders are partly characterised by silent articulatory movements.

To summarise in conclusion, the PRDS project working party has devised the following set of Recommended Additional Phonetic Symbols specifically to supplement the existing transcriptional resources of clinicians and others engaged upon the investigation of disordered speech. It has been found during the course of the project and through teaching RAPS to students and clinicians, that the symbols are acceptable to those who will probably use them most and are relatively easily learned. It is hoped that the RAPS tape in this Report-cum-Teaching Pack will enable these conventions to become more widely known and used. For it has been demonstrated with certainty, from the experiences of members of the PRDS project working party, colleagues and clinicians, that these Recommended Additional Phonetic Symbols provide a useful resource for the representation of disordered speech.

RECOMMENDED ADDITIONAL PHONETIC SYMBOLS
for the representation of segmental aspects of disordered speech

A. Relating mainly to place of articulation

| | | |
|---|---|---|
| 1. Bilabial trills | | p͡p͡p  b͡b͡b |
| 2. Lingualabials (tongue tip/blade to upper lip) | plosives, nasal | ᴘ  ʙ  ᴍ |
| | fricatives | ɸ  β |
| | lateral | ʟ |
| 3. Labiodental plosives and nasal (ɱ is an alternative to the usual ŋ) | | p̪  b̪  m̪ |
| 4. Reverse labiodentals (lower teeth to upper lip) | plosives, nasal | p̫  b̫  m̫ |
| | fricatives | f̫  v̫ |
| 5. Interdentals (using existing IPA convention for advancement) | plosives, nasal | t̪̺  d̪̺  n̪̺ (or t̺̪ etc) |
| 6. Bidentals (lower teeth to upper teeth) | fricatives | ẖ  ẍ̪ (or ẍ̺ etc) |
| | percussive | ǃ̪ |
| 7. Voiced palatal fricative (reserving j for palatal approximant) | | ʝ |
| 8. Voiced velar lateral (using existing IPA convention for retraction) | | ʟ̠ |
| 9. Pharyngeal plosives (do.) | | ʡ  ʢ |

B. Relating mainly to manner of articulation

10. Segments with nasal escape:

| | |
|---|---|
| (i) nasal fricatives (audible turbulent nasal egressive air-flow; no oral escape) | m̥ᶠ  mᶠ  n̥ᶠ  ŋᶠ etc. |
| (ii) nasalized fricatives | s̃  z̃  x̃ etc; also s̃ᶠ etc |
| (iii) sounds intermediate between oral stop and nasal | t̃  d̃  p̃ etc |

NOTE: The nasality diacritic, [˜], may be freely used to denote nasal resonance or escape; it does not in itself imply nasal *friction*, for which the raised [ᶠ] is recommended.

11. Lateral fricatives with sibilance  ɬˢ  ɮᶻ etc; or ɬʃ etc

12. Strong/tense articulation ) * f̱ m̱
13. Weak/lax/tentative articulation ) f̱ m̱

*as compared with the norm for the segment in question

14. Reiterated articulation (as in dysfluencies and palilalia) p͡p͡p etc

15. Alveolar slit fricatives (using existing IPA convention for retraction) θ̱ ð̱

16. Blade (as opposed to tip of tongue) articulation s̪ t̪

17. Plosive with non-audible release p˺ b˺

C. Relating to vocal fold activity

18. Unaspirated (where explicit symbolization is desired) p⁼ t⁼ etc

19. Pre-voiced; post-voiced (i.e. with voicing starting earlier/ continuing later than the norm for the segment in question) ˬz zˬ etc

20. Partially voiced (for segments normally voiceless; use where "s̬" etc is not sufficiently explicit) ˬs sˬ etc

21. Partially voiceless (for segments normally voiced; use where "z̥" etc is not sufficiently explicit) ₒz zₒ

22. Preaspirated ʰp ʰt etc

D. Relating to air-stream mechanism

23. Pulmonic ingressive s̪ˀ m̪ˀ etc

24. Oral (velaric) egressive ('reverse click') ↴ etc

25. Zero air-stream (absence of air-stream mechanism, but articulation present; 'silent articulations', 'mouthing') (f) (m) etc

NOTE: This may occur simultaneously with an articulation using some other air-stream mechanism, e.g. ʔ͡(f) ŋ͡(f)

E. Relating to duration, coarticulation, and pausing

26. Excessively short m̆ ĕ ə̆ etc

NOTE: It is felt that confusion is unlikely to arise between this use and the customary IPA use to denote non-syllabicity; but this diacritic should *not* be used to denote mere absence of length.

27. Prolonged (using existing IPA conventions) — m: (or m::) etc; p: (i.e. with prolonged hold/closure stage)

28. Silence, with absence of coarticulatory effects between segments or words

| | | |
|---|---|---|
| short | - thus | ʌn-də |
| long | -- | ʌn--də |
| extra long | --- | ʌn---də |

F. Relating to secondary articulation

29. Lip rounding (using existing IPA convention for labialization) — s̬

30. Lip spreading — s̟

G. Relating to inadequacy of data or transcriptional confidence

31. "Not sure" — Ring doubtful symbols or cover symbols, thus

| | | |
|---|---|---|
| ◯ | entirely unspecified articulatory segment | |
| (C) | unspecified consonant | |
| (V) | unspecified vowel | |
| (S) | unspecified stop | |
| (F) | unspecified fricative | |
| (A) | unspecified approximant | |
| (NAS) | unspecified nasal | |
| (AFF) | unspecified affricate | |
| (LAT) | unspecified lateral | |
| (PAL) | probably palatal, unspecified manner | (etc) |
| (ɬ) | probably [ɬ], but not sure | (etc) |
| mɪ(ɤ)(k) | probably [ɤk], but not sure | (etc) |

Note: A voiced, but otherwise unspecified, fricative may be shown as (F̬); similarly, a voiceless, but otherwise unspecified, stop as (S̥); and so on.

32. Speech sound(s) masked by extraneous noise — (( ))

thus bɪg ((bæd wʊl))f

or bɪg ((2 sylls))

33. The asterisk. It is recommended that free use be made of asterisks (indexed, if necessary) and footnotes where it is desired to record some segment or feature for which no symbol is provided.

RECOMMENDED ADDITIONAL PHONETIC SYMBOLS
for the representation of segmental aspects of disordered speech

The accompanying recording demonstrates the sounds for which new symbols have been devised. For each category of sounds (interdentals, nasalised fricatives etc.) one or more examples are given between [a] vowels. These examples are followed by some of these sounds in contexts in which they might occur in disordered speech.

Not all variations in articulation are clearly distinguishable by auditory means alone. For instance, labiodentals and reverse labiodentals may sound very similar. However, reverse labiodentals may occur in disordered speech and are easily recognised visually. The accompanying recording contains some examples which compare these sounds with normal pronunciation.

A. Relating mainly to place of articulation

1. Bilabial trills [apːpːa abb͡bba]

pram [pːpːæm] bridge [bb͡bɪdʒ]

2. Lingualabials [aPa aBa aMa aɒa a8a aLa]

letter ['letə 'LePə] Noddy ['nɒdi 'MɒBi] seas [siz ɒi8 ]

3. Labio-dental plosives and nasal [apa aɒa amɐa]

happy ['hæpi 'hæpi] rubber ['ɹʌbə 'ɹʌɒə]
hammer ['hæmə 'hæmə]

4. Reverse labiodentals [apa aɒa amɐa afa avɐa]

happy ['hæpi] rubber ['ɹʌbə] hammer ['hæmə]
photograph ['fəʊtəgɹɑf 'fəʊtəgɹɑf] ever ['ɛvə 'ɛvə]

5. Interdentals [a$^{+}_{\text{ɐ}}$ta a$^{+}_{\text{ɐ}}$da a$^{+}_{\text{ɐ}}$na a$^{+}_{\text{ɐ}}$la a$^{+}_{\text{ɐ}}$sa a$^{+}_{\text{ɐ}}$za]

letter ['lɛtə 'l$^{+}_{\text{ɐ}}$ɛt$^{+}_{\text{ɐ}}$ə 'l$^{+}_{\text{ɐ}}$ɛt$^{+}_{\text{ɐ}}$ə]
daddy ['dædi 'd̪æd̪i 'd$^{+}_{\text{ɐ}}$æd$^{+}_{\text{ɐ}}$i]
annoy [ə'nɔɪ ə'n̪ɔɪ ə'n$^{+}_{\text{ɐ}}$ɔɪ]
Sue [su s̪u θu θ̪u s$^{+}_{\text{ɐ}}$u]

6. Bidentals [a͆a a͇a a⁑a]

Sue [͆u]
zoo [͇u]
kiddie [⁑ɪ⁑i]

7. Voiced palatal fricative [aʝa]

yes [ʝes]

8. Voiced velar lateral [aʎ̠a]

hollow ['hɒʎ̠əʊ]

9. Pharyngeal plosives [aʠa aɢa]

car [ʠa]
organ ['ɔɢən]

B. Relating mainly to manner of articulation

10. Segments with nasal escape [am̥$^{F}$a am$^{F}$a an̥$^{F}$a aŋ$^{F}$a ašа ažа
aχ̃a aš̃$^{F}$a at̃a ad̃a ap̃a]

teapot ['n̥$^{F}$ɪ̃m̥$^{F}$ʊ̃n̥$^{F}$]
sands /sænz/ [s̃æ̃nn$^{F}$]
adder ['æ̃d̃ə]
Susie ['s̃$^{F}$ũz̃$^{F}$ɪ̃]

11. Lateral fricatives with sibilance [aɬ$^{ʃ}$a aʓ$^{ʒ}$a]

washing ['wɒɬ$^{ʃ}$ɪŋ]

12. Strong/tense articulation [ɑsɑ ɑxɑ ɑmɑ]
" " "

kissing ['kɪsɪŋ]
"

13. Weak/lax/tentative articulation [ɑfɑ ɑmɑ]
˕ ˕

kissing ['xɪsɪŋ]
˕ ˕

14. Reiterated articulation [ɑp͡ p͡ pɑ ɑv͡ v͡ vɑ]

a paw ə 'p͡ p͡ pɔ]
a van ə 'v͡ v͡ væn]

15. Alveolar slit fricatives [ɑθɑ ɑðɑ]

think [θɪŋk θɪŋk]
easy ['izi 'iði]

16. Blade articulation (tongue tip may be down)
[ɑs̻ɑ ɑt̻ɑ]

tasty tomatoes ['t̻eɪs̻t̻i t̻ə'mɑt̻əʊz̻]

17. Plosive with non-audible release [ɑp˺ ɑb˺]

apt [æp˺ t] (normal)
mat [mæt˺]

C. Relating to vocal fold activity

18. Unaspirated [ɑp=ɑ ɑt=ɑ]

pan [p=æn]

19. Prevoiced, postvoiced [ˬzɑ ɑzˬ ˬbɑ ɑdˬ]

zoo [ˬzu]
ease [ɪzˬ]
bee [ˬbɪ]
mad [mædˬ]

20. Partially voiced [ɑ̬sɑ ɑs̬ɑ]

bus [bʌ̬s]
Sue [s̬u]

21. Partially voiceless [ɑ̥zɑ ɑz̥ɑ]

zoo [z̥u] (normal)

ease [iz̥] (normal)

22. Preaspirated [ɑʰpɑ ɑʰtɑ]

desk [deʰk]

mist [mɪʰt]

D. Relating to airstream mechanism

23. Pulmonic ingressive [ɑ͡sɑ ɑ͡mɑ]

bush [bʊ͡ʃ]

24. Oral (velaric) egressive [ɑ↴ɑ]

eight [eɪ↴]

25. Zero airstream: not illustrated

E. Relating to duration, co-articulation and pausing

26. Excessively short miss [mɪš]

27. Prolonged hammer ['hæm:ə]
happy ['hæp:i]

28. Silence with absence of co-articulatory effects

under ['ʌn-də 'ʌn--də 'ʌn---də]

F. Relating to secondary articulation

29 and 30. Lip rounding and lip spreading [ɑs͡ɑ ɑsɑ ɑs͡ɑ]

soon [s͡un] (normal)

listen [lɪs͡ən]

sharp [ʃ↔ɑp]

G. Not illustrated

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