# Non-native Speakers' Misperceptions of English Vowels and Consonants:

## evidence from Korean adults in UK

Paul Tench

*Abstract*

There is very little evidence of research in the receptive dimension of phonological interlanguage – how non-native speakers manifest their competence in processing phonological input. A simple, but effective, experiment is described in this paper in which the receptive interlanguage phonological competence of non-native speakers is investigated. The target is British English vowel and consonant phonology, for 20 Korean adults in higher education in UK. Their data indicates the major difficulties they display in perceiving British English consonants and vowels, as opposed to – and contrasted with – producing them.

The paper discusses the paucity of receptive phonological data, presents a methodology which includes a contrastive phonological analysis, exploits a parallel study in productive phonological interlanguage and produces a comprehensive analysis of the subjects' misperceptions (and their mispronunciations). It also speculates on the strategies they used when their interlanguage phonology proved inadequate. Finally, individual and group phonological profiles are provided, against which published pronunciation materials are measured – and shown to be inadequate in many cases.

The study shows the importance of an adequate phonological competence and the importance of adequately designed teaching materials.

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## 1. Misperceptions

There has been a noticeable gap in interlanguage studies which James (1998) has helped to identify and which this paper seeks to make a contribution to filling. James categorized five general types of error (viz omission, redundancy, misselection, misordering and blends) operating at twelve levels. The levels are substance (or medium), text and discourse, in both speech and writing, both productively and receptively, and are displayed in the following chart (James 1998: p 130):

| | | | |
|---|---|---|---|
| 1 | Errors in encoding in speaking | (Mispronunciations) | |
| 2 | Errors in encoding in writing | (Misspellings) | SUBSTANCE |
| | | | |
| 3 | Errors in decoding in hearing | (Misperceptions) | ERRORS |
| 4 | Errors in decoding in reading | (Miscues) | |
| | | | |
| 5 | Errors in composing spoken text | (Misspeaking) | |
| 6 | Errors in composing written text | (Miswriting) | TEXT |
| | | | |
| 7 | Errors in understanding spoken text | (Mishearing) | ERRORS |
| 8 | Errors in understanding written text | (Misreading) | |
| | | | |
| 9 | Errors in formulating spoken discourse | (Misrepresenting) | |
| 10 | Errors in formulating written discourse | (Miscomposing) | DISCOURSE |
| | | | |
| 11 | Errors in processing spoken discourse | (Misconstrual) | ERRORS |
| 12 | Errors in processing written discourse | (Misinterpretation) | |

James then proceeds (p 130-172) to discuss and illustrate misspellings and mispronunciations, and then all the text and discourse errors in both production and reception. What he does not do is discuss 3 and 4 in the above chart, misperceptions and miscues at the level of substance. The aim of this paper is to make a credible attempt at providing some evidence of misperceptions – 'errors in decoding in hearing'. The data presented in this paper derives from a simple, though effective, technique by which non-native speakers indicate their perception of words read out by a native speaker with a standard accent from a carefully selected list. The target language is British English; the subjects who provided the evidence of misperceptions are 20 adult Korean students in higher education in UK.

Misperceptions, in James's terminology, are errors in the perception of the phonological composition of language data, and reveal the operation of an interlanguage competence in the 'receptive' mode of language activity. Understandably, a great deal of interlanguage research has been conducted in the 'productive' modes of speaking and writing, since such data is relatively accessible for inspection; audio recordings and written material display the non-native speakers' productive attempts in communicating in the target language. But how is the operation of the non-native speakers' receptive competences investigated? There is no comparable record. It can often be seen whether a person has understood a message by their response; for instance if they have misunderstood *collar* for *colour* when talking about the purchase of a shirt.

The research reported here relates specifically to the case of phonological misperceptions of British English by Korean adults in higher education in UK. It parallels a study by Ahn (1997), following Tench (1996), of the successes and failures in the production of English pronunciation

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by Korean adults in UK. In her comprehensive study, she shows which consonants and vowels created the greatest problems for them for effective communication in English to local, British, native speakers of the language. For instance, Ahn discovered that British judges had great difficulty in correctly interpreting the Korean subjects' attempts at the short vowels and / O: / - as predicted by a Contrastive Analysis – but much less difficulty in correctly interpreting the neutral vowel, long vowels (except / O: /) and diphthongs. The long vowels of Standard Korean that correspond to the other four long vowels of RP require very similar tongue positions; and although the Korean subjects tended to articulate the RP diphthongs over two consecutive syllables, they were easily interpreted as what was intended.

Amongst the consonants, native speaker judges had greatest difficulty in correctly interpreting the Korean attempts at the following voiced obstruents / γ, b, z, Δ, v/, followed by a variety of consonants / p, j, d, s, N, f, T, l /. Correct interpretations of Korean attempts at / γ / were as low as 30%; attempts at / p / measured 49%, and at / l / 68%. No problems emerged with / m, n, h, w / and very few with / t, ʃ, tʃ /. Full details are in Ahn (1997).

But how well did they *perceive* the pronunciation of native speakers? If Ahn's study provides the evidence of difficulties in their own pronunciation of English (their *productive* phonological interlanguage), what evidence is there of their difficulties in accurate perception of native-speakers' pronunciation (their *receptive* phonological interlanguage)? Ahn did, in fact, experiment along these lines by getting three Korean adults to record their perceptions of an RP speaker's word list, but as Ahn herself admits (p 324) the sample is too small to generalise from. The research reported here is a full-scale version of that experiment and involves 20 subjects.

The importance of research in productive and receptive interlanguage phonology can be gauged from the findings of Jenkins (1995, 2000) who reported the evidence from her investigations that the vast majority of communication breakdowns between non-native (mainly Japanese and European) speakers engaged in target language communication were caused by weaknesses in phonological competence. She investigated the cause of such breakdowns in the talk of 'upper intermediate' and 'low advanced' learners of English and came to the conclusion that a staggering 70% of the cases were the result of weaknesses in both the production and the perception of phonology; unfamiliar lexis accounted for 20% of the breakdowns, and the remaining 10% was shared between errors in grammar and pragmatics and the pace of the delivery of the utterances. Thus, even for relatively advanced learners, phonology proved to be the greatest challenge to successful communication.

Effective, intelligible, communication relies on competence at *all* levels of language combined. One can imagine a language learner with a high degree of proficiency in lexis being hindered by a low degree of proficiency in grammar; or a high degree of communicative awareness being hampered by a low degree of articulatory ability; and so on.

On the other hand, it must be conceded, a weakness in one area may be compensated by the context of situation. For example, if a non-native speaker, when looking at a work of art, comments 'I like his use of callers', *callers* is likely to be interpreted as *colours*! If, on the other hand, a similar expression was offered in the context of selecting a shirt ('I don't like the caller' where *caller* might be interpreted as either *colour* or *collar),* then a breakdown in

communication is likely since the context of situation is no help, and  the linguistic context offers no compensation.  In other words, a non-native speaker might often succeed despite a number of deviations from a standard form of the target language, but cannot expect to do so always.

## 2. Methodology

If we are to genuinely measure phonological competence (as opposed to *all*  levels combined), we must be able to do so without the compensatory effect of the context of situation or the contribution of the other levels of language.  We need a methodology that can capture the potential hazard of substituting the vowel / O: / for / ç / or / Θ / in a word like *colour* and *collar* and other such contrasts.

The first stage is to prepare a contrastive phonological statement.  A brief guide to the phonology of Korean is found in the Handbook of the International Phonetic Association (see Lee 1999). The vowel and consonant charts are reproduced here.

Lee notes (p 121) certain sociolinguistic variations regarding the current status of / 2, 2: /, but this does not impinge critically on a contrastive statement with English as the target language because it has no similar vowel phoneme. Ahn (1997: 114) also notes a current tendency amongst younger Korean speakers to merge Korean long vowels with the short vowels. This may appear to be critically relevant for English as the target language, but that is, in fact, not the case, because the quality distinction between Korean / ɪ: / and / i / is much less than that between English / ɪ: / and / I /. As noted above, British judges had great difficulty in discerning Korean adults' attempts at most short English vowels. Ahn's predictions (p 137) that / I, Θ, ς, Y / might cause difficulty proved to be correct, as also her prediction that / O: / might too.


The consonant system of Korean is notably different from that of English in five major respects:

1       there is no voicing contrast in the obstruent system (the 'voiced' symbols in the chart represent voiceless lenis articulations; the 'voiceless' symbols represent voiceless fortis articulations, plain and aspirated)

2       there is a very limited fricative system (fortis and lenis [s] )

3       [l] and [r] constitute a single phoneme, with limited distribution

4       there is a very limited set of consonants in the word-final system ( / p, t, k, m, n, N, l / )

5       there is no consonant cluster system in initial or final positions (apart from sequences with [j] and [w], which are traditionally construed as the first element of a diphthong)


Ahn reported her prediction of difficulties with English as follows (p 105):

1       Plosive voice contrasts in word-initial and –final positions

2       Fricatives / f, v, T, Δ, Z / in all positions; / s, z / and / ʃ / in final position

3       Affricate / dZ / in initial and final position; / tʃ /in medial and final positions

4       Lateral / l / in initial position

5       Approximant / r / in initial position

and (p 108)

6       Most consonant clusters

## 2.1 The word list

The word list is then compiled of words that contain a consonant or vowel (or a stress pattern) that appears to be problematical in the light of the contrastive analysis.  The words were selected on the basis of whether they are members of minimal pairs, so that there is a definite potential for misunderstanding.  The advantage of a list of single, isolated words is that there is no possibility of compensation from any other source, and the focus of attention is purely phonological.  Each word is intended to represent a token of a perceived phonological problem; thus item 1 *hit* represents the contrast between /ɪː/ αvδ /I/ throughout the language.

One possible source of conflict is the spelling of the words, but this can be eliminated by choosing items that can be expected to be familiar to the participants and that are spelt according to the commonest patterns of orthography; eg an item like *trough* would be avoided.

The small experiment of Ahn's used the following list of 36 words to test 3 Korean adults' perception of a contrast in the consonant and vowel systems of British English.

The first five words tested the short vowels and / O: /:

| 1 | hit | (to test perception of / I / as opposed to / i: /, as in *heat*) |
|---|---|---|
| 2 | mass | (/ { / ~ / E /, as in *mess*) |
| 3 | spot | (/ Θ / ~ / O: /, as in *sport*) |
| 4 | bought | (/ O: / ~ / ≅Y / as in *boat*) |
| 5 | pull | (/ Y / ~ / ʊ: / as in *pool*) |

The following vowels have no near equivalent in Korean:

| 6 | hut | (/ ç /) |
|---|---|---|
| 7 | contain | (/ ≅ /) |
| 8 | coin | (/ OI /) |
| 9 | waste | (/ εI /) |
| 10 | bite | (/ αI /) |
| 11 | found | (/ αY /) |
| 12 | clear | (/ I≅ /) |

The following consonants in final position are potentially a problem since Korean allows only a very limited number of consonants in that position:

| 13 | rope | (/ p ~ b# /) |
|---|---|---|
| 14 | kilt | (/ t ~ d# /) |
| 15 | duck | (/ k ~ γ# /) |
| 16 | bulb | ( ~ pulp ) |
| 17 | mad | (/ d ~ t# /) |
| 18 | vague | ( ~ bake ) |
| 19 | perch | (/ tʃ ~δZ#  /) |
| 20 | badge | (/ dZ ~ τΣ# /) |
| 21 | tongue | (/ N ~ n# /) |

The following words contain consonants which have no near equivalent in Korean: / l, r, f, v, T, Δ / and / j / (as in *pure*)

| 22 | tail | (/ l# /) |
|---|---|---|
| 23 | reed | (/ #r ~ l /) |
| 24 | pure | (/ j /) |
| 25 | strife | (/ f ~ p# /) |
| 26 | vest | (/ #v ~ b /) |
| 27 | faith | (/ #f / and / T# /) |
| 28 | breathe | (/ #Cr / and / Δ# /) |

The following sibilant consonants have a different pattern of articulation and distribution:

| 29 | hiss | (/ s ~ z# /) |
|---|---|---|
| 30 | buzz | (/ z ~ s# /) |
| 31 | looser | (/ VsV ~ z /) |
| 32 | sheet | (/ #Σι:  ~ si: /) |
| 33 | leisure | (/ VZV ~ δZ /) |

The following consonant clusters are tokens of a pattern that does not exist in Korean:

| 34 | claps | (/ #kl ~ κ≅λ/) |
|---|---|---|
| 35 | sphere | (/ #sf  ~ σ≅ϖ/) |
| 36 | let's | (/ ts ~ τIσ# /) |

The present author used the same word list with 20 subjects, for the purpose of comparison. However, the tokens of consonant clusters were increased by two: *flute* and *frame* were expected to provide useful evidence of perceptual ability, since they contain both the problematical / f / and the / l ~ r / contrast  (~ *fruit, flame*).

Ahn's 36-item word list was constructed originally to test *production*.  It was felt, however, that in order to test *perception* a fuller inventory of phonological segments was required.  The original list happened not to contain the vowels / A: / and / E≅ /, nor all the consonants in both initial and final position; this was totally remedied in the 25-item extension to the word list, which also included some tokens of consonants in medial position:

1       goal    (#γ ~ k)
2       thick    (#T ~ t,s)
3       share   (Σ before a non-front vowel; also E≅)
4       zeal     (#z ~ s before a front close vowel)
5       those   (#Δ ~ d)
6       seep     (#s ~ Σ, before a front close vowel)
7       nought (#n)
8       chart    (#tΣ; A:)
9       jug      (#δZ)
10      robe    (b ~ p#)
11      dove    (v ~ b, f#)
12      mesh    (Σ ~ s#)
13      beige   (Z ~ z#)
14      yeast    (j  singly in initial position, before / i: /)
15      defend (f ~ p in medial position)

16      ladder  (δ ~ Δ in medial position)

17      anger   (γ ~ k in medial position)

18      stable   (b ~ p in medial position)

19      useful  (s ~ T in medial position)

20      rival    (v ~ f in medial position)

21      breezy ( ~ breeze, to test interpretation of final unstressed –ι)

22      bury    (r ~ l in medial position)

23      pilot    (l ~ r in medial position)

24      youthful (T ~ s, as a counter to 19)

25      composure (Z ~ z in medial position)


Thus the total inventory was 63 items: the original list of 36 items, with the addition of *flute* and *frame*, and the second list of 25 items.

## 2.2 The subjects and procedure

The 20 participants were all native speakers of Korean, aged between 21 and 43, 17 of whom were male. They had learnt English at school in Korea and who were then temporarily resident in South Wales as students.  It is relevant to note that in Korea American English dominates in English language teaching, rather than British, as this might partly account for certain problems, for instance the confusion between / E / and / { /.


In each session, the word list was read out, each item twice, with sufficient time for the participants to write down the word they thought they heard.  It was the same speaker for both sessions, the author, with a native accent close to RP.  (His non-RP features did not impinge upon the substance of the experiment, eg his /κλ{σ/ φoρ /κλΑːσ/, χλασσ.) He stood behind the participants so that they could not see lip movement and thus gain a visual clue on labial and rounded articulations; in that way the subjects were compelled to rely solely on their auditory impressions.  One clue of a grammatical nature was offered in the case of the item *looser*; it was glossed as 'That is, more loose'.  All 63 items were assumed to be common enough to belong to

their current lexicon of English, a matter that was confirmed in a subsequent consultation; the only concession was that single gloss on the inflected form *looser*.

He also took the precaution of obtaining a control on the intelligibility of his accent by having a native speaker but with a different accent (educated Welsh English) as an additional participant. That participant's written responses tallied entirely with the word lists. They are, obviously, excluded from the following analysis.

The research was conducted in two sessions: the first session with the first list, the second with the second. Unfortunately, 4 participants were not available for the second session and it was not possible to redeem the situation; the analysis takes care of this discrepancy. In retrospect, it was unfortunate that the dictation of the word lists was not recorded onto audio cassttes, which could have been despatched to the absentees. It had been considered more efficient to use a live voice, as being clearer and more 'authentic', and as offering the opportunity for monitoring feedback as in the case of *looser*.

The data consists of 1,160 written items produced by the 20 participants (only 16 for list 2). On only three occasions did a participant not venture an attempt; these are marked < - > in the following tables.

Correct spelling was judged to be evidence that a word was heard correctly, and thus its constituent phonological composition. Correct spelling of alternative words was judged to be evidence of misperception, eg *heat* for *hit*. Occasionally, two words were written, indicating uncertainty on the participant's part; these are not listed as correct perceptions in Tables 1 and 2,

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but are taken into account as 0.5 in Tables 3 onwards where proportions of perceptions are recorded.

Incorrect spellings were judged case by case. For instance, *buz* for *buzz* was accepted as clear enough evidence of correct recognition, since the present purpose was not a spelling test. On the other hand, some spellings were unrecognisable (marked with the conventional \*); they appear to be participants' hopeful inventions, and were treated as misperceptions. In fact, they prove to be very useful to the analyst, eg the unattested 'English' spellings \**vite,*\* *vait* in response to *bite* (the lack of perceptual clarity between / b / and / v /  for two participants) and \**weaset* for *waste* (the possible perception of an epenthetic vowel between / s / and / t / ), etc.

A summary of the participants' responses is presented in Tables 1 and 2.

The detailed analysis proceeded as follows: the record of perceptions for each vowel and consonant (in both initial and final positions) was inspected in order to produce an analysis of the proportions of correct and incorrect perceptions, and a breakdown of the substitutions in the latter cases; this was done in two ways:  i) taking into account all instances of a particular segment in whatever word they appear (the undifferentiated calculation) and ii) taking into account only those instances which are critical, because of their potential for contrast (the critical calculation).  Thus, for instance, the items *reed, sheet* and *seep* are critical for the distinction / i: ~ I /  because of the potential contrast with minimal pairs; but / i: / is also represented in *breathe* (selected to test final / ∆ /, *zeal* (selected to test initial / z / before the vowel / i: /, *yeast* (selected to test recognition of initial / j / before the vowel / ɪ: / and *breezy* (selected to test recognition of final unstressed / -zi /.  The undifferentiated calculation is: 106 correct perceptions
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out of a total of 124 instances (88.3%); the critical calculation involving only *reed, sheet, seep* is: 47 correct perceptions out of a total of 56 instances (83.9%).  It is the latter calculation that is important, because even if participants mistook the /i: / as / I / in the other words, they might be expected to adjust their interpretation from an unfamiliar * *brith* to a familiar *breathe,* etc; but a similar misperception in the 'critical' would produce a different word altogether.

It is also the case that words selected for a specific segment also yielded valuable evidence for another. A good example is item 2, *mass*, which was selected to test the contrast between / E / and / { /, but it yielded valuable evidence also of the contrast between final / σ / and / T /. This was quite unexpected, as the (British) author uses the form *maths*, rather than *math*,  as a shortening for *mathematics,* but the Korean subjects, influenced by American English, do.

**Table 1: Korean perceptions of an oral English word-list (1)**

| | Word-list | No. correct Perceptions ( /20 ) | Misperceptions (with numbers of participants) |
|---|---|---|---|
| 1 | Hit | 13 | heat (4), hats (2), heat/hit |
| 2 | Mass | 9 | math (8), maps, must, mass/math |
| 3 | Spot | 15 | sport (5) |
| 4 | Bought | 2 | boat (15), boat/bought (2), board |
| 5 | Pull | 7 | pool (10), full, fool, *pourt |
| 6 | Hut | 3 | heart (5), hat (5), hot (4), hurt (3) |
| 7 | Contain | 20 | |
| 8 | Coin | 20 | |
| 9 | Waste | 18 | raised, *weaset |
| 10 | Bite | 17 | bites, *vite, *vait |
| 11 | Found | 19 | Pound |
| 12 | Clear | 19 | Clearer |
| 13 | Rope | 15 | loaf (3), roof, *roaf |
| 14 | Kilt | 11 | guilt (3), cult (2), killed (2), kelt, keep |
| 15 | Duck | 11 | dark (6), dock (2), ducky |
| 16 | Bulb | 5 | *volve (6), verb (5), valve, *Bauber, balb, *bowb |
| 17 | Mad | 16 | *med, man, *muz, *maz |
| 18 | Vague | 18 | *bage, *baig |
| 19 | Perch | 12 | purge (4), *furch, *furture, punch, puzzle |
| 20 | Badge | 14 | buzz (2), *baze, *bugh, barge, budge |
| 21 | Tongue | 17 | turn, thong, *tunsh |
| 22 | Tail | 20 | |
| 23 | Reed | 20 | |
| 24 | Pure | 19 | - (1) |
| 25 | Strife | 17 | stripe (2), stright/strift |
| 26 | Vest | 9 | vast (6), best (4), vat |
| 27 | Faith | 15 | face (4), faith/face |
| 28 | Breathe | 8 | breed (4), breeze (2), bleed, grieve, bribe, *brive, breed/breeze, *brives |
| 29 | Hiss | 5 | heath (7), his (4), *hith, *het, *heash, - (1) |
| 30 | Buzz | 12 | bus (2), verse (2), *burse, *vuzz, buzzer, *baws |
| 31 | Looser | 8 | Luther (6), loser (2), Ruther, Rusa, loose, *Russer |
| 32 | Sheet | 18 | shit, heat |
| 33 | Leisure | 18 | *reiser, *resure |
| 34 | Claps | 9 | collapse (2), clubs (4), clap, clabs, clasp, *crapse, crap |
| 35 | Sphere | 5 | spear (12), spin, fear, spare/spear |
| 36 | let's | 16 | let (4) |
| 37 | Flute | 15 | fruit (5) |
| 38 | Frame | 16 | flame (4) |
| * = invented, non-English words, beyond recognition | | | |
| - = no word offered | | | |

**Table 2: Korean perceptions of an oral English word-list (2)**

| | Word-list | No. correct Perceptions (∕16) | Misperceptions (with numbers of participants) |
|---|---|---|---|
| 39 | Goal | 11 | girl (2), gold, gull, goal/gold |
| 40 | Thick | 11 | seek (3), sick (2), |
| 41 | Share | 16 | |
| 42 | Zeal | 12 | zoo (2), zero, Jew |
| 43 | Those | 14 | though, does |
| 44 | Seep | 0 | thief (6), ship (4), sip (3), seek, sheep, *sif |
| 45 | Nought | 1 | note (11), knot (2), not/note, nought/note |
| 46 | Chart | 16 | |
| 47 | Jug | 6 | jog (5), John, jar, *zeck, Jock, jugger |
| 48 | Robe | 7 | rove (3), road, rude, rogue, rob, robber, roll |
| 49 | Dove | 10 | dub (2), duff, *durf, dull, *dough |
| 50 | Mesh | 2 | mash (14) |
| 51 | Beige | 6 | badge (2), *bazy (2), *bedge, *veidge, *vaige, *baze, *basy, vain |
| 52 | Yeast | 1 | east (13), yeast/east, *ist |
| 53 | Defend | 11 | depend (5) |
| 54 | Ladder | 5 | rather (7), lather, leather, latter, *rada |
| 55 | Anger | 16 | |
| 56 | Stable | 15 | Steven (1) |
| 57 | Useful | 15 | usual (1) |
| 58 | Rival | 15 | live (1) |
| 59 | Breezy | 3 | breeze (6), bridge (3), *bleeze, *breage, *breedge, *reasing |
| 60 | Bury | 6 | very (5), *barry (2), vary, very/vary, |
| 61 | Pilot | 15 | tired |
| 62 | Youthful | 3 | useful (12), - (1) |
| 63 | Composure | 2 | composer (13), composure/composer |

\* = invented, non-English words, beyond recognition
- = no word offered

### 3. Vowels

Table 3 lists the vowels of English in a conventional order with their undifferentiated and critical scores. The final vowel, / -i /, represents a final, unstressed vowel, (as in *breezy*), using the symbol now widely adopted from Wells (1990/2000); see also Jones (1997). The table shows that most of the long vowels (but not / O: / and / ɪ: /, most of the diphthongs (but not / ≅Y /) and the neutral vowel / ≅ /, pose no real problem in perception.

**Table 3: Percentage misperceptions of English vowels**

|  | Undifferentiated | Critical |
|---|---|---|
| ɪ: | 88.3 | **83.9** |
| I | 68.4 | **63.8** |
| E | 75.9 | **41.6** |
| { | 77.6 | **73.9** |
| A: | 100 | **100** |
| Θ | 75 | **75** |
| O: | 13.8 | **12.3** |
| Y | 50 | **40** |
| ʊ: | 97.2 | **97.2** |
| ς | 56.8 | **35.5** |
| 3: | 90 | **90** |
| EI | 98.5 | **97.5** |
| ≅Y | 91.6 | **81.25** |
| αI | 98.6 | **98.6** |
| αY | 100 | **100** |
| OI | 100 | **100** |
| I≅ | 95 | **95** |
| E≅ | 100 | **100** |
| Y≅ | 95 | **95** |
| ≅ | 99 | **97.2** |
| -ɪ | 62.5 | **25** |

Table 4 extracts from Table 3 the evidence that strongly suggests which English vowels Korean adults do have greatest difficulty in perceiving accurately. They include all the short vowels, the final unstressed / -i / , most particularly / O: / and, to a lesser extent, / ≅Y / and / ɪ: /. The table lists these vowels in order of relative difficulty, together with the percentage misperceptions.

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**Table 4: Percentage of correct perceptions of the most difficult vowels**

|  | Correct | Misperceptions, with percentages |
|---|---|---|
| O: | 12.3 | ≅Y 77.7; Θ 9.5 |
| -ι | 25 | O 75 |
| ς | 35.5 | Θ 25; A:: 15.8; { 9.2; 3: 9.2; ≅Y 2.6; E 1.3 |
| Y | 40 | υ: 55; Y≅ 5 |
| E | 41.7 | { 58.3 |
| I | 72.2 | ι: 22.2; { 5.5 |
| Θ | 75 | O: 25 |
| { | 75 | ς 11.5; A: 8.3; E 3.1; ? 2.1 |
| ≅Y | 81.25 | 3: 12.5; ς 6.3 |
| ι: | 83.9 | I 16.1 |

It is interesting to compare these results with the difficulties that Korean adults displayed in *production*. Ahn (1997: 158-68) presents the results of an intelligibility test with respect to vowel production, i.e. the level of difficulty that British native-speaker judges experienced in interpreting their pronunciation. The greatest difficulties that the judges had were in discerning the Korean adults' attempts at vowels as shown in Table 5.

**Table 5: Native speakers' assessment of non-native speakers' production of vowels**

|  | Correct | Main interpretation problems |
|---|---|---|
| Y | 23 | υ: 49.6; O: 9.6; ≅Y 5.6 |
| ς | 45 | Θ 33; O: 6.5 |
| { | 47 | E 36.8; ς 8.8 |
| O: | 53 | ≅Y 37 |
| Θ | 58 | O: 16; ς 8.8 |
| I | 65 | ι: 27.2 |

Tables 4 and 5 suggest that Korean adults in Britain have the greatest difficulty in producing the *pull* vowel / Y / convincingly (Table 5) and have enormous difficulty in distinguishing it from the *pool* vowel / ʊ: / (Table 4). However, their greatest difficulty is in perceiving / O: / as in *bought, nought* (Table 4), as distinct from / ≅Y /, *boat*, *note* (and, to a lesser extent, from / Θ /, *not/knot*) and they have distinct difficulties in producing it in contrast to / ≅Y / (Table 5). The vowel / ς / of *hot, jog* presents enormous difficulties both perceptively and productively; it is most often mistaken for the / Θ / of *hot, jog*, but there is a very wide range of vowel sounds that it is confused with. The / E / of *mess, mesh* and the / { / of *mass, mash* cause problems too, although the / E / is produced adequately enough – it does not appear in Table 5. (The speakers' previous long exposure to the American accent would at least partly account for these problems.) The *hit* vowel / I / is often confused with the *heat* vowel / ı: /, again both perceptively and productively.

Final unstressed / -i / is very often not perceived as a separate phoneme, thus *breezy* was interpreted as *breeze* (or *bridge*, etc) by 75% of Korean listeners (see Table 2); it was interpreted by one subject as *\*reasing*, who no doubt correctly identified an unstressed final syllable but was not able to identify it with < -y > or match their perception of the whole word with an actual English word. This misperception is, of course, the reverse of Korean production of vowel paragoge following obstruents, eg pronouncing *rich* as [ rIτΣι ], *ridge* as [ ρIδZι ] (see Ahn, 1997: 193 – and page after page to 245!)


**4. Consonants**

Table 6 provides a summary of correct perceptions of simple consonants in initial and final positions in 'critical' words.

**Table 6: Percentage of correct perceptions of simple consonants in 'critical' words**

|   | Initial | Final |
|---|---|---|
| π | 90 | 63.8 |
| β | 56.25 | 50 |
| τ | 100 | 96.6 |
| δ | 100 | 92.5 |
| κ | 100 | 97.5 |
| γ | 100 | 86.1 |
| φ | 97.5 | 85 |
| ϖ | 80 | 62.5 |
| T | 68.75 | 77.5 |
| Δ | 93.75 | 40 |
| σ | 31.25* | 36.25 |
| ζ | 93.75* | 65 |
| ʃ | 95* | 100 |
| Z | - | 68.75 |
| tʃ | 100 | 70 |
| δZ | 93.75 | 80 |
| η | 100 | - |
| μ | 100 | 100 |
| ν | 100 | 100 |
| N | - | 90 |
| λ | 81.58 | 94.9 |
| ρ | 97.2 | - |
| φ | 6.25* | **-** |
| ω | 95 | **-** |
| * = specifically before / i: / | | |

The greatest difficulties (> 80%) in initial position appear to be

**Table 7: Perceptions of initial simple consonants**

| Initial | Correct | Main misperceptions, % |
|---|---|---|
| j (+ ι:) | 6.25 | Ø  93.75 |

| | | |
|---|---|---|
| s (+ ɪː) | 31.25 | T 37.5; ʃ 31.25 |
| β | 56.25 | v 43.75 |
| T | 68.75 | s 31.25 |
| ϖ | 80 | b 20 |

Ahn (1997: 179) provides data that shows that her Korean subjects found it almost impossible to produce the words *yeast* and *year* successfully; 92% of British judges found it impossible to hear any difference between *yeast* and *east*, and 82% any difference between *year* and *ear*. Table 7 shows perceptual confusion between initial / s / and / T /, and between initial / b / and / v /; Ahn (1997) reported difficulties in the production of initial / v / and / T /. She also reported difficulties in the production of initial / Δ / and / f /, but such difficulties do not appear to extend to perception (see Table 6).

As is well known (Eckman 1977), consonants in final position constitute a greater level of difficulty than in either intial or medial positions; the list is double the length of the problematic initial consonants as is shown (> 80%) in Table 8.

**Table 8: Perceptions of final simple consonants**

| Final | Correct | Main misperceptions, % |
|---|---|---|
| σ | 36.25 | T 41.25; z 10 |
| Δ | 40 | d 27.5; z 12.5; v 10 |
| β | 50 | v 18.75; d 12.5 |
| ϖ | 62.5 | f 12.5; b 12.5 |
| π | 63.8 | f 33.3 |
| ζ | 65 | s 25 |
| Z | 68.75 | δZ 25 |
| τΣ | 70 | δZ 20 |
| T | 77.5 | s 22.5 |
| δZ | 80 | z 15 |

The author was particularly surprised at Korean perception of final English / s /: he did not anticpate either from the contrastive analysis or from a consideration of universal tendencies that more participants would heard it as the relatively marked – in universal terms - / T / than the 'unmarked' / s /. He drew the participants' attention to this particular misperception and found that it was only when he articulated final / s / with a  fortis (and untypically long) articulation that they were able to distinguish *mass* from *math*.

Final / Δ / was also poorly perceived, being interpreted variously as / d /, / z / or / v /.  There was a good deal of mutuality in the confusion over final / b, v, p, f /.  / z / was often misperceived as / s /, as was / T /.  / Z / was often misperceived as / dZ /, as was / tʃ/; but / dZ / was mainly misperceived as / z /.

These misperceptions tally to a certain extent with Ahn's data on the difficulties in production; see Table 9.

**Table 9: Native speakers' assessment of  non-native speakers' production of final consonants**

| Final | Correct | Main interpretation problems |
|---|---|---|
| γ | 30 | k 33.6; O 6.4 |
| β | 34 | O 17.6; p 14.4; d 9.6 |
| ζ | 34 | s 51.2; t 6.4 |
| Δ | 40 | d 24; T 16; v 8 |
| Z | 40 | δZ 24; d 20; z 8 |
| π | 49 | O 10.4; k 9.6; b 6; f 6 |
| λ | 52 | O  44 |
| δ | 58 | t 13.6; O 8 |
| ϕ | 58 | p 22.5; v 10 |
| σ | 58 | z 13.7; d 4.8; t 4; O 4 |

| | | |
|---|---|---|
| T | 62 | s 24; t 8; O 4 |
| N | 62 | n 12.8; nd 7.2; m 6.4 |
| δZ | 73 | tʃ 15.2; Z 2.4 |
| κ | 74 | γ 8; t 6.4 |

This suggests that whereas Korean subjects failed to produce / γ, d, k / convincingly (Table 9), they had no real difficulty in perceiving them – they do not appear in Table 8. The labial obstruents / p, b, f, v / all appear as productive problems in final position, / f / is less of a problem perceptually – it does not appear in Table 8. / T / and / Δ / appear in both tables, but as expected (Eckman, 1977), it is the voiced / Δ / that constitutes the greater problem – not that they are typically confused with each other: / T / is regularly confused with / s / both perceptually and productively, but / Δ / with / d /. The perception problems associated with final / z, Z, δZ / are matched with production problems, although / tʃ / appears to be only a perception problem.

The perception of / l / and / r / was reasonably successful (Table 6),  more so for / r / (97.2%) than for / l / (81.58%), despite the evident difficulties in production. Ahn's data (p 176) suggest that Korean speakers were 74% successful in producing / l / in initial position, 68% successful in medial position, and 52% in final position; initial / l / was otherwise interpreted as / r / (20%), medial / l / as / r / (16%), and final / l / as zero (44%). With respect to / r /, Ahn's data (p 177) suggests that her Korean speakers were 78.5% successful with initial / r / - interpreted as / w / (5%), as / n / (4%) or as / l / (3%) - and 64% with medial / r /, but interpreted as / l / at 28%.

The degree of successful perception of clusters has not been dealt with as thoroughly and systematically as one would wish. In retrospect, it would have been useful to have elicited more

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targeted data; nevertheless, Table 10 presents what information there is, and Table 11 gathers together what information there is in Ahn (1997: 187-92) about production.

**Table 10: Percentage perceptions of consonant clusters**

| Initial | Correct | Main misperceptions |
|---------|---------|---------------------|
| σf | 25 | sp 70; f 5 |
| φl | 75 | fr 25 |
| φr | 80 | fl 20 |
| βr | 88.8 | bl 5.5 |
| κl | 80 | kr 10; k≅l 10 |
| πj | 95 | - 5 |
| σp | 100 | |
| σt | 100 | |
| σtr | 100 | |
| Final | Correct | Main misperceptions |
| λb | 30 | lv 35    b 30 |
| πs | 60 | bz 25  p 10 |
| τs | 80 | t 20 |
| λt | 85 | ld 10 |
| σt | 94.6 | |
| νd | 100 | |

**Table 11: Native speakers' assessment of  non-native speakers' production of  consonant clusters**

| Initial | Correct | Main interpretation problems |
|---------|---------|------------------------------|
| σf | 40 | sp 52 |
| πl | 44 | fl 20; p  l 16 |
| βl | 44 | l 32; βIλ 20 |
| βr | 44 | ρ 28; w 12 |
| κl | 56 | κ≅l 20; pl 12; kr 12 |
| φl | 56 | kl 13; r 8.7; γr 8.7 |
| κr | 64 | kl 16; k 12 |
| σp | 84 | f 8; p 4 |
| σk | 84 | σIκ 16 |
| τr | 92 | κr 4; pr 4 |
| Final | Correct | Main interpretation problems |
| τs | 44 | s 40; t∫ 12 |
| κt | 44 | κIτ/dZ 20; k 16; t 16 |

| κs | 64 | ps 8; sk 8; s 4; γz 4 |
|----|-----|-----|
| λp | 80 | lt 8; p 4 |
| λκ | 88 | g 8  lp 4 |

The perception and production of initial / sf- / is the outstanding problem; otherwise it is quite noticeable that perception is less of a problem than production.  The / l / element in an initial cluster is usually articulated successfully, the / r / element less well, particularly with / k /; it is the lead consonant that is problematic in production but the / l ~ r / in perception.

In final clusters, the / -lb / is the outstanding problem in perception, involving two problematical final consonants.  However, / l / in a final cluster with voiceless plosives does not seem to occasion difficulties on the same scale in either perception (Table 10) or production (Table 11).

Clusters of two obstruents are more of a problem in production, either being interpreted as reduced (eg / -ts / → / -s /, / -kt / to either / -k / or / -t / ) or reversed (eg / -ks / to / -sk / ) or separated by an epenthetic vowel (eg *packed* to *packet* or *package*).  In perception, some subjects failed to notice / -s / in / -ps, -ts / (reduction) or interpreted a voiceless cluster as if voiced, / -bz / for / -ps /.

## 5. Epenthesis and paragoge

Epenthesis is typical of interlanguage phonology, particularly in the case of consonant clusters in the target language that do not correspond to an equivalent in the mother tongue.  Epenthesis in articulation is well enough documented and is evident in Table 11, where some of Ahn's Korean subjects produced *plight* in such a way that in native speakers' judgments it sounded like *polite*, *blow* as *below, claps* as *collapse*, *skewer* as *secure*, and *packed* as *packet* or *package*.  When two

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participants heard the word *claps,* they interpreted it as *collapse*, suggesting epenthesis in reception, too; likewise, one participant – a different one – interpreted *waste* as *\*weaset.* However, the level of epenthesis was much less marked in reception as it was in production.

Paragoge is typical of interlanguage phonology in the case of a more extensive final consonant system in the target language than exists in the mother tongue. Paragoge was a regular feature of Ahn's subjects in their production of English words with final obstruents, as noted above, eg *rich* as / rIτΣι / etc. In reception too, a number of participants interpreted final release as an additional unstressed syllable; thus *duck* was interpreted as *ducky, bulb* as *\*Bauber, perch* as *\*furture* and *puzzle, buzz* as *buzzer, jug* as *jugger, robe* as *robber,* and *beige* as *\*basy / \*bazy.* On the other hand, final unstressed syllables were interpreted in a couple of cases as release of final syllables, eg *rival* as *live*, and notably *breezy* as *breeze, \*bleeze, \*breage, bridge, \*breedge* – in fact, only four of the sixteen participants identified the final unstressed syllable, and only three did so correctly.

## 6. Supplementary Strategies

How could one of the participants mistake initial / p / with / t /, especially as it matches a phonemic contrast in their mother tongue phonology, and interpret *pilot* as *tired* (item 61) ? The answer lies in the multiplicity of factors that feature in our processing of an acoustic signal. If the listener's linguistic competence (phonology, grammar, lexis, discourse) matches the speaker's, there are usually very few linguistic problems in processing the signal. If the listener's competence does not match, then there is a strong likelihood that problems will arise. If the listener's phonological competence in particular does not match, there is a very strong likelihood that a problem will arise in respect of an acoustic signal consisting of a single word

with no linguistic or situational context.  If such a problem arises, the listener has to resort to a set of strategies to help make some kind of interpretation.

One strategy that is familiar in interlanguage studies is *over-correction*.  This might account for one participant's interpretation of the signal *tongue* as *thong*.  They know that they have to monitor their own articulation as well as their reception carefully to distinguish the less familiar / T / from the very familiar / t /; and as they monitor, they decide whether any perception of [ t ] ought in fact to be interpreted as / T /.  They are often correct, but occasionally 'correct' an interpretation that was in fact not incorrect, and decide on, for instance, *thong* even though they heard an initial [ t ].  This might also help to explain the interpretation of *rival* as *live*; the listener monitors for vowel paragoge in order to avoid it, hears an unstressed final syllable, decides against interpreting it as such, thus reducing the interpreted word to a single syllable and is forced to interpret the remainder [ rɑIϖ ] as *live*, since no word like *\*rive* exists.  In this latter case, an additional strategy has been employed.

That additional strategy relates not to phonology, but to the listener's lexical competence.  The listener possesses a mental lexicon in the target language; in the above case, the listener dismisses *\*rive* as non-existent – and is correct in doing so – and refers to their mental lexicon via their phonological competence and accesses *live*.  Their knowledge of past difficulties in distinguishing between / r / and / l / may well confirm their interpretation. This is a kind of *re-processing of the lexical content of the cue.*

A third strategy is *lexical anticipation*, ie expecting a more familiar or more common word. For example, a listener may hear *kilt* but dismisses it in favour of the more familiar and common word *guilt* – again despite a similar (but, admittedly, not phonetically identical) contrast in the mother tongue phonology.

A fourth strategy is *guessing*, in the context of recognising their own limitations in the target language lexicon. This might explain *\*vite* (for *bite*), as a back formation from *invite*, and *\*volve* (for *bulb*) from *involve*. Guessing is probably the cause of most of the misperceptions marked \* in Tables 1 and 2. It represents a deliberate strategy for compensating for a presumed deficiency in lexical competence in the target language.

A fifth strategy is a *response with reference to an imagined semantic context*, like a lexical set. For example, if *chick* followed *chest* in a word list, a listener might be tempted to interpret *chick* as *cheek*, because of the imagined context of 'parts of the body'. (No evidence of this in the present data, Tables 1 and 2).

These strategies appear to account satisfactorily for all the (apparent) anomalies in the data, ie where a phonological explanation is not sufficient in itself. The detail of each case is presented in the Appendix.

## 7. Interlanguage phonological competence

With the kind of data presented here, it is possible to inspect interlanguage phonological competence on both an individual and group basis. This amounts to drawing up an individual's

or a group's phonological profile in the processing of target language heard input. The value of doing so is, on the one hand, to provide an individual with very specific feedback, for self-monitoring and remedial purposes, and on the other, to provide information that is relevant for the devising of classroom materials that are specific to a whole group.

We will attempt to portray one participant's English phonological competence in perception – it would have been most revealing if it had been possible to have access to his productive competence too, but unfortunately the participants in Ahn's experiments (Ahn 1997) do not overlap with the participants in the experiment presented here.

The participant selected is one of the better ones, and his profile will then be contrasted with the group profile. The following misperceptions are recorded, in his case, in Table 12:

**Table 12: One subject's record of misperceptions**

| target word | | Misperception | |
|---|---|---|---|
| 2 | mass | Math | s# as T# |
| 4 | bought | Boat | O: as ≅Y |
| 6 | hut | Hurt | ç as 3: |
| 14 | kilt | Cult | I as ç |
| 15 | duck | Dock | ç as Θ |
| 16 | bulb | Verb | ç as 3:; #b as #v; lb# as b# |
| 19 | perch | *furch | #p as #f |
| 26 | vest | Vast | E as { |
| 28 | breathe | Breeze | Δ# as z# |
| 29 | hiss | Heath | #I as ι:; s# as T# |
| 31 | looser | Luther | -s- as -T- |
| 39 | goal | Gull | ≅Y as ç |
| 44 | seep | Thief | #s as #T; p# as f# |
| 45 | nought | Knot | O: as Θ |
| 50 | mesh | Mash | E as { |
| 51 | beige | Badge | Z# as δZ# |
| 52 | yeast | East | #ji: as #ι: |
| 54 | ladder | Rather | #l as #r ; -d- as -Δ- |

| 60 bury | *Barry | E as { |
|---|---|---|
| 62 youthful | Useful | -T- as -s- |
| 63 composure | Composer | -Z- as –z- |

It is clear that this participant does not confidently discriminate between / E / and / { /; / { / is firm in all contexts except possibly in *ladder* (as *rather*, but American pronunciation of the latter is with / { /; see Wells 2000). / ç / is mainly perceived satisfactorily in non-critical cases, eg *tongue, buzz, dove,* but in critical cases, he is unable to distinguish *hut* from *hurt, bulb* from *verb* and *duck* from *dock*; he is successful with *jug* - not perceived as *jog.* / O: / was not identified at all. There is a degree of uncertainty with / I /.

The perception of / Θ / and / Y / was successful, as were the other monophthongal and diphthongal long vowels, and the weak vowels / ≅ / and final /-i /. This participant's English vowel phonology in perception can therefore by characterized as lacking / E /, / ç / and / O: / and uncertain in respect of / I /.

As for the consonants, there is a high degree of uncertainty between / s / and / T / in all positions; / s / was only successfully identified in clusters; / T / was successfully identified except in *youthful.* Perhaps this is a case of over-correction, vainly substituting the new item, / T / , for the more familiar / s /. This might also explain interpreting the intervocalic / d / of *ladder* as the new item / Δ /, and the (familiar) / p / as the new item / f /. However, it does not explain final / Δ / as/ z /, nor / Z / as either / z / or / dZ /. Thus the major problems reside in the fricative articulations.

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The plosive and affricate system is otherwise firmly established, as is the nasal system. Amongst other resonants, initial / l / in *ladder* was interpreted as / r /, final / l / in the / lb / cluster in *bulb* appeared not to have been perceived, and / j / before / ɪ: / was not perceived at all. This participant coped with all the clusters satisfactorily. Thus, his English consonant phonology in perception can be characterized as lacking a distinction between / s / and / T / in all positions, and lacking / Δ / in final position, lacking / Z / in all positions, and lacking / j / before front close vowels; and uncertain in respect of / p / and / f / in initial and final positions, / d / and / Δ / in medial position, and / l / and / r / in initial positio

The one item that has not been accounted for is his interpretation of *bulb* as *verb*. The leading problems might well have been the misinterpretation of / ç / as / 3: / - see also *hurt* for *hut* – and the non-recognition of / l / in the final cluster, suggesting a non-existent */ b3:b /; as the participant engages in the strategy of lexical re-processing, *verb* is accessed, and just as he over-corrects familiar / p / with the new item / f /, he appears to have engaged in a parallel over-correction, exchanging / b / for an imagined / v /. Lexical re-interpretation does not express phonological competence directly.

The deficiencies in this participant's receptive phonological competence in English can be summarized as follows:

**Table 13: An individual Korean speaker's interlanguage English segmental phonology**

| | Vowels | Consonants | | |
|---|---|---|---|---|
| | | Initial | medial | Final |
| Lacking | E | s/T | s/T | s/T |
| | ς | j(+ ɩ:) | | |
| | O: | | Z | Z |
| | | | | Δ |
| | | | | λb |
| Uncertain | I | p/f | | p/f |
| | | | d/Δ | |
| | | l/r | | |

This compares favourably with the rest of the group of participants. For the purposes of designating the characteristic receptive phonology of the group, we assume that scores below 50% in Tables 1, 2, 4, 6, 7, 8 and 10 suggest that items are lacking in most of the group, and that scores between 50% and 79% suggest a noteworthy degree of uncertainty. Thus, the deficiencies in the group's receptive phonological competence in English can be summarised as follows (Table 14):

**Table 14: A general Korean interlanguage English segmental phonology**

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| | Vowels | Consonants | | |
|---|---|---|---|---|
| | | Initial | Medial | Final |
| Lacking | E<br>ς<br>Y<br>O:<br>- ι | s(+ ι:)<br>j(+ ι:)<br><br><br>sf/sp | s/T<br><br>Z | s/T<br><br><br>δ/Δ<br><br>λb/lv |
| Uncertain | I<br>{<br>Θ | b/v<br>T/s<br><br><br><br><br><br><br><br>fl/fr | <br><br>p/f<br>d/Δ | b/v<br>T/s<br>p/f<br><br>ϖ/f,b<br>z/s<br>Z/δZ<br>τʃ/dZ<br><br>πs/bz |

Although most of the individual's deficiencies are included within the group's, there are certain idiosyncrasies, eg his uncertainties of initial p/f and l/r are not shared by the group.

## 8. Conclusion

The value of this data and its analysis is the information it provides teachers and course designers. By a procedure as described in this paper, it is possible to gain specific information on general problems of phonological perception, but also on individual profiles, enabling teachers to focus attention accordingly.

Table 14 can also function as a guide to course designers. Many English pronunciation course materials are not specific enough in two respects. Firstly, relevant contrasts are not always taken into account, eg Trim & Kneebone (1975) contrast / ς / with / {,A:,Θ / but not with / 3: /; / p / and / f / are not contrasted with each other. Secondly, contrastive consonant practice usually

concentrates on initial position to the neglect of final position, eg Rogerson & Gilbert (1990) contrast / T / and / s / in initial position only.

The following tables chart the coverage of the phonological problems identified in Table 14 in materials produced for British English pronunciation.  American materials have been excluded simply because the focus throughout this paper has been on Koreans' perceptions of a standard British accent which includes the British vowels / ç, 3:, Θ /.  The ✓ indicates that the contrast is dealt with systematically, **i** indicates that it is dealt with incidentally; a blank indicates that it does not deal with it at all.

**Table 15: Teaching materials' coverage of relevant vowel contrasts**

| Course | I/ʊ: | E/{ | {/A: | {/ɕ | ɕ/Θ | ɕ/A: | ɕ/3: | Θ/O: | O:/≅Y | Y/ʊ: |
|---|---|---|---|---|---|---|---|---|---|---|
| Arnold & Gimson (1965) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Trim & Kneebone (1965) | ✓ | ✓ | | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ |
| Munro Mackenzie (1967) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Byrne & Walsh (1973) | ✓ | ✓ | ✓ | ✓ | | | ✓ | ✓ | ✓ | ✓ |
| Gimson (1975) | i | ✓ | | ✓ | ✓ | i | | ι | | i |
| Baker (1977) | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ |
| Baker (1982) | ✓ | ✓ | ✓ | ✓ | | | | ✓ | ✓ | ✓ |
| Ponsonby (1982) | ✓ | ✓ | | | i | | | i | | |
| Hooke & Rowell (1982) | ✓ | ✓ | ✓ | ✓ | | | | ✓ | ✓ | ✓ |
| O'Connor & Fletcher (1989) | ✓ | ✓ | | ✓ | | | | ✓ | ✓ | ✓ |
| Rogerson & Gilbert (1990) | ✓ | | | i | i | i | i | | | |
| Hewings (1993) | i | ι | | i | i | | | i | i | i |
| Brazil (1994) | | | | | | | | | | |
| Cunningham & Bowler (1990) | ✓ | | | ✓ | i | i | i | i | i | ✓ |
| Bowler & Parminter (1992) | ✓ | ✓ | | ✓ | | | | ✓ | ✓ | ✓ |
| Cunningham & Moor (1996) | ✓ | | | i | | | i | I | ι | |

| Course | Initial and medial consonants, necessary for Korean learners | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | s~ʃ+i | j+I | b/v | T/s | fl/fr | sf/sp | -s/T- | -z/Z- | -p/f- | -d/Δ- |
| Arnold & Gimson (1965) | | | | ✓ | | | | ✓ | | ✓ |
| Trim & Kneebone (1965) | | | | ✓ | | | | i | | |
| Munro Mackenzie (1967) | i | | ✓ | ✓ | ✓ | | | ✓ | | ✓ |
| Byrne & Walsh (1973) | | ɩ | ✓ | ✓ | | | | | | |
| Gimson (1975) | | | ✓ | ✓ | | | | | | |
| Mortimer (1977) | | | | | ✓ | | | | | |
| Baker (1977) | i | | ✓ | ✓ | | | | | | ɩ |
| Baker (1982) | | | | | | | | | | |
| Hooke & Rowell (1982) | | | | ✓ | | | | | | |
| Ponsonby (1982) | i | | | ✓ | i | | | i | | |
| O'Connor & Fletcher (1989) | i | | ✓ | ✓ | i | | | | i | ✓ |
| Rogerson & Gilbert (1990) | | | ✓ | ✓ | | | | | | |
| Hewings (1993) | | | i | i | | | | | | |
| Brazil (1994) | | | | | | | | | | |
| Cunningham & Bowler (1990) | ✓ | | ✓ | | | | | | | |
| Bowler & Parminter (1992) | i | | | | | | | | | |
| Cunningham & Moor (1996) | | | | | | | | | | |

Teaching materials' coverage of relevant initial and medial consonants and clusters
Table 16

| Course | p/f | b/v | T/s | d/Δ | s/z | δZ/Z | δZ/tʃ | ps/bz | lb/lv/b | δZ/δZ ɩ |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| Arnold & Gimson (1965) | | | ✓ | ✓ | ✓ | ✓ | ✓ | | | |
| Trim & Kneebone (1965) | | | ✓ | | i | | ✓ | | | |
| Munro Mackenzie (1967) | | | ✓ | | ✓ | | ✓ | | | |
| Byrne & Walsh (1973) | ✓ | ✓ | | ✓ | ✓ | | ✓ | | | |
| Gimson (1975) | | | | | | | i | | | |
| Mortimer (1977) | | | | | | | | ✓ | ɩ | |
| Baker (1977) | ✓ | | ✓ | | | | ✓ | | | |
| Baker (1982) | | | | ✓ | | | | | | |
| Hooke & Rowell (1982) | | | | | ✓ | | ✓ | | | |
| Ponsonby (1982) | | | | | i | | i | ɩ | | |
| O'Connor & Fletcher (1989) | | | ✓ | i | ✓ | | ✓ | ɩ | | |
| Rogerson & Gilbert (1990) | | | | | | | | | | |
| Hewings (1993) | | | ɩ | | i | | | ɩ | | |
| Brazil (1994) | | | | | i | | | | | |
| Cunningham & Bowler (1990) | | | | | i | | | | | |
| Bowler & Parminter (1992) | | | | | i | | | | | |
| Cunningham & Moor (1996) | | | | | i | | | | | |

Teaching materials' coverage of relevant final consonants and clusters

Table 17

The tables show that the problematic vowels are not always covered adequately in every course, nor the problematic consonant contrasts, especially in medial and final positions.  On the other hand, certain contrasts are, admittedly, very limited: words contrasting / j / with zero before / ɪ:, I, I≅ / amount to just *yeast/east, yin/in(n), year/ear* and possibly *yields/eels* and *Yeadon/Eden*; words with / sf / are limited to *sphere, sphinx* and their derivatives, to a few other words of Classical Greek origin and the Italian *sforzando* – contrasting with *spear* and *Spinks* (and possibly *sports and* …..!).  Nevertheless, when these few words do occur, communication breakdown easily occurs, as when a Korean theological student puzzled over the interpretation of 'pastoral spear' (for the *pastoral sphere*!).

The lack of complete coverage of the actual problems of pronunciation for adult Korean learners in the specialist pronunciation coursebooks listed probably reflects the bias that the materials have towards European learners.  It may well be that the number of Korean students in Higher Education in UK was small until the boom years of the Korean economy of the 1990s and hence the relatively small interest in Korean students' problems.  Publishers will also maintain that their materials can not cover all language backgrounds.

However, there is another cause for the lack of coverage, and that is the paucity of the kind of interlanguage study reported here and in Ahn (1997).  It is not enough to produce a contrastive phonological statement; it is also important to conduct interlanguage research.  Nilsen & Nilsen (1971)     report     the     following     predictions     of     problems     in     vowels:

/ɪ: − I /; /eI − E /; / εI − { /; / E − { /; / { − A: /; / ς − O: /; / A: − O: /.  This list includes contrasts that appeared in the interlanguage studies not to be problematical, but excludes others that appeared to cause the greatest problems, eg  / O: − ≅Y /; / ς − Θ / etc (Table 4).

A third cause for the lack of coverage is the relatively small attention given to consonants in final position – witness the blanks in Table 17 – despite knowledge of universals and Eckman's Markedness Differential Hypothesis (Eckman, 1977).  For instance, Borden et al (1983, 1985) confine their attention solely to word initial positions.  Also, no course attended to the possibility of vowel paragoge in interlanguage attempts at problematical final consonants.

A fourth cause is linked: the relatively small attention given to consonant clusters, especially, in final position – witness the specific blanks in Tables 16 and 17.  Again, no course attended to the potential of epenthetic vowels to produce contrasting words.

A fifth point could be added.  This paper incidentally makes it clear that receptive and productive interlanguage phonological competence can be different – and specifically that receptive competence is no guarantee of productive competence.

Finally, a sixth point is worth mentioning.  All participants in spoken discourse, whether native or non-native speakers, resort to supplementary, non-phonological, strategies when interpreting phonetic input. This paper provides evidence of how a non-native speaker does so, to compensate for an inadequate receptive phonological competence.  Naturally, in real live

conversation, context will often help, but learners – and teachers – would be well advised to seek

to establish an adequate phonological competence, both receptively and productively.

*Centre for Language and Communication Research, Cardiff University, Wales, UK*

*tenchp@cardiff.ac.uk*


## Appendix

1       *hit:* two participants interpreted this as *hats*. Two phonological points lie behind this

interpretation. Firstly, American pronunciation of / E / is closer than British / E / ανδ ισ τηυσ χλοσερ το

British pronunciation of / I /; and / E / and / { / are frequently confused (Table 4). Secondly, Korean final

/ t / is realised as an unreleased voiceless bilabial stop [ τ← ] (Lee 1999: 122), whereas the final / t / in

English *hit* would have been released with aspiration or, possibly affrication; the release was obviously

interpreted as a separate segment, / s /. The two phonological points combine to suggest *hats.*

2       *mass*: two participants interpret final / s / as if accompanied by a stop, viz *maps, must*.

/ s / is never final in Korean; the only voiceless obstruent final options in the system are / p, t, k /. The

additional stops may well be cases of over-correction.

6       *pull:* one participant guessed this as *\*pourt*. Final / l / was not heard, perhaps because it

was 'dark' rather than the 'clear' variety expected in Korean. It was also noted that production of final / l /

as in *tail* was not very successful (Table 9). However, something *was* heard, possibly interpreted as the

past tense homophone of *poured*, interpreting final / d / as the more familiar / t /.

11      *kilt:* one participant interpreted this as *keep.* Presumably, / I / was perceived as / ɪː /,

which would produce the unknown *\*keet*, but was re-interpreted to the known *keep.*

17      *mad*: an interpretation as *\*med* (possibly, an abbreviation of *medical student*) can be attributed to typical

confusion between / { / and / E /. Two participants perceived the final segment as / z /, possibly

interpreting the voiced release as friction.

19      *perch:* this word is less familiar than *punch*, / n / being added in the re-interpretation process. Two

participants perceive final paragoge, which matches typical production (Ahn 1997: 198 provides an actual

instance of this); one uses the guessing strategy *(\*furture)*, the other the re-interpretation strategy (*puzzle*).

21     *tongue:* one instance of over-correction *(thong,* see above).   *\*Tunsh* might be a guess; perhaps the participant was sensitive to a possible / γ / articulation at the end, leading to an interpretation of some kind of obstruent.

28     *breathe:* three participants interpreted final / Δ / as / v /; two guessed at unfamiliar words (*\*brive, \*brives*), one employed the re-interpretation strategy (*grieve*).

35     *sphere:* 13 of the 20 participants perceived the initial / sf / as / sp /; however, one did not connect with *spear,* but used the re-interpretation strategy and imagined a final / n / for *spin.*

42     *zeal:* four did not notice the final 'dark ' / l /, and re-interpreted the word as *zoo, zero* and, with an additional step, *Jew.*

43     *seep:* seven of the 16 participants interpreted the final / p / as / f /, which would produce an unknown *\*seef.* One guessed at *\*sif,* the other six re-interpreted it as *thief*; this could also be treated as a case of over-correction as they monitor their final / s / for cases of / T /.

47     *jug:* half were misled by perceiving / ς / as / Θ /, which explains *jog*; familiar / k / for     / γ / explains further the interpretation as *Jock,* which also contributes to the interpretation as *\*zeck.* *John* is also a re-interpretation from a less familiar *jog.*

48     *robe:* final / b / as / d / is possibly the result of an expectation of a more familiar word; final / b / as / γ / would produce *rogue.*

58     *rival:* as *live,* possibly over-correction to counter vowel paragoge, and re-interpretation, as described above.

61     *pilot:* one participant interpreted this as *tired.* No doubt, this first stage in the processing was to misperceive medial / l / for / r /, to produce the expected *pirate.* But this did not happen, perhaps because final / t / was not distinguished from final / d / which is not altogether dissimilar from Korean final lenis unreleased / t /, yielding / παIρ≅δ / which does not match anything in English lexis, forcing a re-interpretation to access *tired.* (Does this participant actually pronounce *tired* as / ταIρ≅δ / as the spelling suggests?)

42

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