

**Korean misperceptions of British English consonants and vowels:
An Experiment in Applied Interlanguage Phonology**

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This study is an outcome of Ahn's (1997) much larger investigation into the intelligibility of Koreans' pronunciation of English in a British context. It is important to note the limitation to the British context because the dominant model of English in the teaching of the language in Korea is North American. However, as Korean business was expanding in the UK, an ever increasing influx of Korean personnel and families make their mark in language classes, in all levels of education, and in British society in general. Ahn's investigations have, therefore, a very topical relevance as well as making a very valuable contribution to the literature on interlanguage phonology.

The methodology she used follows Tench (1996:255-8). A conventional contrastive analysis (CA) yields indicators of probable difficulties in the production of the target language segments; in this case, the analysis yielded a list of consonant and vowel articulations in British English (ie RP, or *BBC English* as Roach & Hartman (1997:v) now prefer to call it) that Korean speakers are likely to find difficult. A list of appropriate minimal pairs was assembled, in which the potentially problematic segment was matched with a corresponding segment that was deemed to be easily transferable. The CA, for example, suggested English /ɪ/ as a potential problem; thus, minimal pairs were chosen with a contrasting /i:/ in the expectation that Korean speakers would have difficulty in distinguishing between the pair. A Korean subject would be asked to read aloud (and record) the word with the problematic segment; the recording would then be played to 5 British judges, who without access to the word would be asked to write down what they thought the Korean subject had said. The judges' perceptions would then be matched against the word that the subject was asked to pronounce, and a measure of intelligibility would result.

For example, the word *hit* was chosen as it provides a minimal pair with *heat*; it contains the potentially problematic segment /ɪ/, and it was anticipated that a Korean subject's attempt to produce the word might lead the British judges to perceive the subject's rendering of the word as *heat* - in which case, there would certainly emerge a problem of intelligibility. A word list of 36 items was assembled to test the quality of Korean pronunciation of the English short vowels /ɪ, æ, ɒ, ʌ, ʊ, ə/, the long vowel /ɔ:/

, a range of diphthongs: /ɔɪ, eɪ, aɪ, aʊ, ɪə/, the following consonants in word-final position / p, t, k, b, d, g, tʃ, dʒ, ɳ/, the following consonants in a variety of positions / l, r, j, f, v, θ, ð, s, z, ʃ, ʒ/, two CC clusters in initial position, and one CC cluster in final position.

25 Korean students took part; each was recorded rendering a word list, and each recording was submitted to 5 judges. To prevent the judges becoming over familiar with a single list, 5 different lists were devised. Thus, 5 subjects read from Word List 1, 5 from Word List 2, etc; each judge listened to 5 different lists. The judges were all native speakers of English with an educated, if not precisely an RP, accent; none of them knew the Korean language or had had any exposure to a Korean accent of English. They were the kind of people who the Korean subjects might encounter in daily life; in other words, ‘ordinary listeners’ as Kenworthy (1987:20) called them.

A word list was used rather than phrases, sentences or any other text that approached natural, spontaneous speech, in order to eliminate any effect of linguistic context. Admittedly, the subjects would rarely engage in such an exercise in real life, although it is not entirely irrelevant as names of people, products, etc, are usually independent of context. It was important to eliminate the effect of context in order to focus the investigation on purely phonological competence. Incidentally, a check was made that each subject was familiar with each word in their Word List, in order to eliminate undue reliance on orthography and to reduce any psychological pressure. The judges, on the other hand, were told that they might be confronted with an occasional unusual word, in order to reduce any ‘over-interpretation’ on their part.

Ahn discovered that the British judges had great difficulty in correctly interpreting the Korean subjects’ attempts at the short vowels and /ɔ:/ - as predicted by the CA - but much less difficulty in correctly interpreting the neutral vowel, long vowels (except /ɔ:/

) 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, the judges had greatest difficulty in correctly interpreting the Korean attempts at the voiced obstruents /g, b, z, ð, v/, followed by a variety of consonants /p, j, d, s, ɳ, ʒ, f, θ, l/. Correct interpretations of Korean attempts at / g / 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).

Ahn also reported a small trial experiment reversing the roles. In this case, one of the Word Lists was recorded by the author, and three of the original subjects wrote down

what they perceived to be the words recorded. A lapse of 12 months prevented any detailed recall of the Word List. The results are listed below.

Table 1 here

The sample is, of course, too small to generalize from, especially as Subject 3's failure to record 7 items would skew any attempt at doing so. Nevertheless, some patterns of perception and misperception do emerge, eg all 3 perceived *hit* correctly, but none of them *hut*, or *hiss*. However, before I venture into further discussion, and before I present the findings of a fuller experiment, it would be worthwhile reviewing the way a listener processes items from a word list.

Processing items from a word list

A word list is not a genre typical of natural, spontaneous, spoken discourse, except as a way of checking or counting the presence of individual people, or such things as the availability of goods in stock; there are, thus, only occasionally, situations in which a list of individual words is an appropriate form of discourse. However, for the purposes of investigating phonological competence it is an invaluable tool, because the individual items in a list are divested of any meaningful context, so that an awareness of grammar, lexis, discourse management or any message cannot interfere with or distort the data. Orthographical interference can be reduced to a minimum by careful selection of the items.

Although the use of a word list in (non-experimental) spoken discourse may not be uncommon, when it does occur, it does have a meaningful context, either formally (eg alphabetically) or semantically (the actual subject matter). But the kind of word list envisaged for phonological investigations must be seen as having no such meaningful context, ie it is composed solely on phonological criteria which are not revealed to the subjects.

If a listener's phonological competence matches that of the speaker who performs the word list, no problem with interpretation is expected - assuming also that there is no external interfering noise. Thus, for the sake of argument, an RP listener will be expected to have no phonological problem in interpreting an RP speaker. Their phonological competence is identical: the system of phonemes, their realization, distribution and selection in specific lexical items, and word prosody.

If a listener's phonological competence does not match that of the speaker, the degree of intelligibility depends on the degree of divergence. The divergence may be systemic (eg presence/absence of /ʌ/, realizational (eg /u:/ as [u:], [ʊu], [u:]), etc), distributional (eg presence/absence of /j/ in *beauty*), lexical (eg /æ/ or /ɑ:/ in *glass*), or prosodic (eg stress placement in *inquiry*). The listener's knowledge about

the language variation possibilities is then engaged in the process of interpretation. A single point of divergence requires a minimal effort at interpretation; on the other hand, multiple points of divergence in a combination of all categories will produce an enormous hindrance to intelligibility. This latter situation is not infrequent even amongst native speakers of the same language who nevertheless employ very different accents. (Personal anecdotes will no doubt abound in the minds of many readers.)

If either the listener or the speaker are not native users of the language, then either perception or production is likely to be adversely affected by the phonological ‘filter’ of the native language(s). The degree of effectiveness is directly related to the level of phonological competence.

If neither the listener nor the speaker are native users of the language, two filters will be in operation. Jenkins (1995, 1996) provides excellent examples of this situation. One such is of Japanese and Swiss German learners of English engaged in a task in a language school, in which one sought to describe to the other the content of a single picture which the other then, on the basis of the given information, had to identify from a set of six similar pictures. They were of upper intermediate/lower advanced ability. On one occasion, the listener (Swiss German)

had problems in completing the task successfully because the speaker told him that in her picture there were ‘three / led / cars’. This was borne out by the follow-up discussion (also recorded), where the following exchange took place.

- A: I didn’t understand the let cars. What do you mean with this?
B: Let cars? [very slowly] Three red / red / cars
A: Ah, red.
B: Red / red /
A: Now I understand. I understood car to hire, to let.
Ah, red, yeah I see.

This breakdown in communication occurred even though only one picture contained any cars, the cars were red and there was no evidence to suggest that they were for hire.

(Jenkins 1996:36)

The Japanese phonological filter had produced [led] for / red / and the Swiss German filter had perceived the [led] as [let] - and this despite the context!

The process of interpreting an item read out aloud from a word list relies very heavily on matching phonological competences; but other factors may come into play too,

such as the listener's assessment of the likelihood of an item (eg "It sounded like *forced*, but I bet it was supposed to be *first*."), and the tendency to try and find some meaningful connection with other items in the list (eg if *chick* followed *chest*, a listener might be tempted to interpret [tʃɪk^h] as "obviously meant to be /tʃi:k/"). These interpreting, but non-phonological, processes show the importance of care in the selection and sequencing of items.

The listener receives the speaker's signal, interprets it according to their own phonological competence and attempts to match it to the mental spoken form of an item in their own lexicon. If the listener and speaker share a common phonology and lexicon, an interpretation can be confidently assessed as correct. A possible exception involves the case of homonyms and homophones: the signal /raɪt/ might be interpreted as *right* (= not left) or *right* (= not wrong), or as *rite*, *write*, or *wright*. If the listener and speaker share a common phonology but not a common lexicon, the hearer might either interpret a signal as an unfamiliar lexical item, eg "/ma:'mɔ:rɪəl/? I don't know this word!"; or might attempt a re-interpretation to find a familiar item, eg "/ma:'mɔ:rɪəl/? I suppose they mean *memorial*".

If the listener and speaker do not share a common phonology, but do share a common lexicon, the amount of processing depends on the degree of divergence, eg the signal /glæs/ will be interpreted as /gla:s/, or vice versa. On the other hand, a signal like [flʌr?n] might not be comprehended at all.

If either the listener or the speaker, or both, operate an interlanguage phonology through the filter of their mother tongue, then the scope for misperceptions and misinterpretations increases; the extent of potential misperceptions depends on the level of the respective interlanguage competences. For example, a Korean beginner learning English might well fail to distinguish /θ/ from /s/ at all; but an intermediate learner might have established the /θ~s/ contrast in initial and medial position, but not yet in final position. The interpreting process, however, is likely to be hampered not only by phonological mismatching but also by a restricted lexicon. For example, the signal [bri:ð] is provided; the listener's phonology might not recognize the final [ð] but perceives it as [v]; however, /bri:v/ does not match anything in their lexicon, and as they puzzle over the wrongly perceived signal, they search for the nearest matching item and might find *grieve*. If the search requires more than the critical period of the 5 seconds for which the brain can retain an accurate acoustic image of an unfamiliar item (Rivers, 1964:106, Dodson, 1967:19), then the processing loses the acoustic image and resorts to other strategies like guessing. In such a case, a segment originally and clearly perceived as [b] is abandoned in favour of a similar segment that will yield a meaning to the item as a whole. However, sometimes the guessing by the language learner reveals a strategy akin to that of a native speaker who assumes that they have encountered a new unfamiliar word ("Brive? I don't know this word, but I suppose it must exist in the target language").

Evidence of misperceptions in the trial experiment

In the trial experiment reported by Ahn (1997), there is evidence of phonological mismatching, re-interpretation within an interlanguage lexicon, the invention of unknown words, and judgment-refusal.

i) Vowels

The vowel /æ/ was mistaken for /ʌ/ by two of the subjects. This might be because the phonetic realization is typically more open, [a], in UK than in USA, which is the accent more current in Korea. Not recognizing the closer, American, vowel led to a perception of a different vowel altogether. Furthermore, there is considerable evidence of indeterminacy in the judgements of all 3 subjects of /ʌ/ itself, cf. *hot* and *heart* for *hut*; *bold* and *board* for *bulb*; and *turn* for *tongue*.

For one subject, there is also a misperception between /ɒ/ and /ɔ:/, cf *sports* for *spot*.

Although all 3 subjects perceived /ɪ/ in *hit*, there was clearly less confidence with the /ɪ/ in *hiss*. The final /s/ may well have been a distraction; /s/ does not occur in word-final position in Korean.

One subject perceived /eɪ/ as /ɪ/, cf. *whist* for *waist*; but the overwhelming evidence in the rest of the experiment suggests that this diphthong does not usually cause a problem, cf. the all-correct perceptions in *contain*, *vague*, *fail* and *faith*. That same subject, alone, perceived /ɪə/ in *clear* as [ɪ].

One subject misperceived /ʊ/ as /u:/ (*pool* for *pull*) and two /əʊ/ as /u:/, but in the latter case, lexical re-interpretation may have played a role.

The evidence suggests that the main problems that the Korean subjects had in perceiving the vowels of RP might be amongst the short vowels, particularly /ʌ/ and /æ/ and to a lesser extent /ɪ, ʊ, ɒ/. There seems to be no problem with /ɛ, ə/ and relatively few problems with long vowels and diphthongs.

ii) Consonants

The misperceptions of consonants in initial position were confined to /l, r, v/ and the clusters /pj, sf/. Initial /l/ was mostly well perceived, cf. *lets*, *leisure*, *claps* and *clear* and, for two of the subjects, *looser*. /r/ was slightly less well perceived: twice as /l/, once as /w/; in a cluster, there appeared to be no problem, cf. *strife*, *breathe*. In fact

the main problem was /v/: two of the three subjects misperceived it, mainly for /b/, on both occasions, the items *vague* and *vest*.

Of the clusters, one subject failed to recognize /j/ in *pure*, and two failed with /sf/ in *sphere*.

Only one consonantal misperception was recorded in intervocalic position, but the data is unfortunately very slight.

The major problem was the final position. All six English plosives produced problems; but of the nasals, only /ŋ/, and even that might have been the result of lexical re-interpretation, cf. *turn* for *tongue*, on account of a misperception of the vowel; but the fricatives were very poorly perceived, except when they combined with a plosive in a final cluster. The most serious problems were with /θ, ð, s/; as noted above, the Korean /s/ does not occur in final position.

The evidence points unmistakably to obstruents in final position as the greatest problem for Koreans listening to English, and to a lesser extent to the liquids and /v/ in initial position.

iii) re-interpretation within an interlanguage lexicon

As described above, a non-native listener receives a phonological signal through a mother tongue filter and if the filtered perception does not immediately match an item in the current interlanguage lexicon, a second attempt at interpretation follows. Evidence of this appeared in this data. For example, the /æ/ of item 2, *mass*, is perceived as /ʌ/; there is no /mʌs/ in the lexicon, and so an alternative is sought. Final /s/ is particularly vulnerable to misperception, as we have seen, and so the indeterminate nature of its perception allows the listener a degree of freedom for re-interpretations. The result for one subject is a re-interpretation to *must*, and for another subject a re-interpretation that is even wider from the target, *nuts*. Presumably, in the similar case of *met* for *mad*, /æ/ is misperceived as /ɛ/; there is no /med/ in the lexicon, and so the final /d/ is re-interpreted as /t/; in universal terms, this /d/ is doubly marked (both final, and voiced) and is thus vulnerable to re-interpretation.

This process seems to explain *turn* for *tongue*, *clip* for *clear* - there is no /kli/ in the lexicon, and so a final consonant was invented - and, more interestingly, both *roof* and *loop* for *rope*. The evidence suggests first a misperception of the vowel, leading to a first attempt at interpretation as /ru:p/ which fails, and then a second attempt; for one subject, the vulnerable initial liquid allowed an interpretation to /l/; but for the other, the vulnerable final obstruent allowed an interpretation to /f/, clearly a case of over-correction. Perhaps the prominent aspiration of English /p/ contributed, as quite

possibly the prominent aspiration of /t, k/ lead also to interpretations of *spot* as *sports*, and *duck* as *duct*.

The actual order of this re-interpretation process is not always clear. In item 29, *hiss*, did the /ɪ/ as /i:/ trigger the process, or the / -s/ as / -θ/? It is difficult to say as there is neither a /hi:s/ or a /hiθ/ in the lexicon. Indeterminacy between /θ/ and /s/ is evident also in the invented **Ruther* for *looser* (is that, perhaps, a Korean pronunciation of *Luther*?) and in the interpretation of *faith* as *face*.

Bulb, item 16, proved interesting too. The highly vulnerable /ʌ/ was perceived by one subject as /əʊ/; there is no /bəulb/ (or even /bəulv/) in the lexicon, so *bold* is chosen. The perception of /ʌ/ as /ɔ:/ led another subject to search for a non-existent /bɔ:lb/ and finally settle for *board*. The vulnerability of doubly marked final voiced plosives (in universal terms, viz /d/ above) is confirmed also by an interpretation of *vague* which ignores the final /g/ altogether.

iv) judgement-refusals

Subject 3 offered no interpretation of the items *kilt*, *perch*, *badge* and *tongue*, and the final three items *claps*, *sphere* and *let's*. There is unfortunately no opportunity for consultation with him, and thus one is left to one's own speculations. Maybe *kilt* was simply known to him. Maybe he lost concentration for a run of items (19 to 21) or even lost heart (the final three items)! But it is noticeable that six of the seven items contain vowels that a CA predicts as difficult, five contain clusters, which Korean does not in any case allow, and two contain affricates in a position, i.e. final, not permitted in Korean.

Evidence of misperceptions in a second experiment

The author conducted an identical experiment but with a larger sample, 13 subjects, who matched the age and academic background of the subjects in Ahn's experiment. However, in the second experiment, the word list was not recorded, but read out aloud in their presence; it was, however, the same speaker in both experiments, with an accent close to RP. The speaker stood behind the subjects 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". Two additional items were included to test perception of initial clusters with /l/ and /r/ in conjunction with a non-Korean articulation, /f/; hence items 37 and 38, *flute* and *frame* tested perceptions which would contrast with *fruit* and *flame*, respectively. All 38 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 the gloss on the inflected form *looser*. The

author chose to use the same word list despite its limitations in order to make an accurate comparison and thus establish (or disconfirm) the pattern of perceptions.

The author took the precaution of obtaining a control on the intelligibility of the speaker's accent by having a native speaker but with a different accent (educated Welsh English accent) as an additional 14th subject. That subject's written responses tallied entirely with the speaker's word list. They are, obviously, excluded from the following analysis.

The results of the experiment are given in summary form in the table below.

Table 2 here

i) Vowels

The word list happens to contain instances of all the vowels of English except /a:/ and /ɛə/. This might seem an inexcusable oversight, but it must be remembered that the original intention of the word list was to test the intelligibility of Korean **production** of English phonology; the CA predicted that /a:/ would not be a problem, and tokens of centring diphthongs already existed in the forms of /ɪə, ʊə/.

The vowel /i:/ was represented in three items: *reed*, *breathe*, *sheet*. Thus the perception of it was tested 39 times, i.e. 13 subjects heard each of the three words. On only one occasion was the vowel misperceived, and so the accuracy of perception was 38/39 (97.4%).

The vowel /ʌ/ figured in five items: *hut*, *duck*, *bulb*, *tongue*, *buzz*, hence in 65 instances. Only 34 judgments were accurate; there were 9 judgments of it as /a:/, 9 as /ɒ/, 8 as /ɜ:/, 4 as /æ/ and 1 as /ɔ:/. In this case, accuracy of perception was measured at 34/65 (52.3%).

The vowel /ʊ/ figured in only one item. Again, this might be construed as a regrettably low level of selection planning, but the original intention was to test production, not perception, and a single token was considered sufficient for that purpose. Thus there were only 13 perceptions available for the one item *pull*. It is significant, however, that only 6 subjects perceived it accurately (46.2%).

Despite the unevenness of the distribution of the vowels in the word list, it is of great interest to note the variation in the degree of perceptual accuracy, as in the table below.

| Vowel | Total no. of judgments | No. of correct judgments | Percentage correct | Misperceptions (%) |
|-------|------------------------|--------------------------|--------------------|--|
| i: | 39 | 38 | 97.4 | I (2.6) |
| I | 39 | 24 | 61.5 | i: (23), ε (10.3), Λ (5.1) |
| ε | 39 | 34 | 87.2 | æ (12.8) |
| æ | 52 | 43 | 82.7 | Λ (15.3), ε (1.9) |
| ɒ | 13 | 10 | 76.9 | ɔ: (23.1) |
| ɔ: | 13 | 4 | 30.8 | əʊ (69.2) |
| ʊ | 13 | 6 | 46.2 | u: (53.8) |
| u: | 26 | 26 | 100 | |
| ʌ | 65 | 34 | 52.3 | ɑ: (13.8), ɒ 13.8), ɜ: (12.3) æ (6.2), ɔ: (1.5) |
| ɜ: | 13 | 12 | 92.3 | ʌ (7.7) |
| ə | 26 | 26 | 100 | |
| eɪ | 78 | 78 | 100 | |
| əʊ | 13 | 12 | 92.3 | u: (7.7) |
| aɪ | 26 | 26 | 100 | |
| aʊ | 13 | 13 | 100 | |
| ɔɪ | 13 | 13 | 100 | |
| iə | 26 | 25 | 96.2 | I (3.8) |
| ʊə | 13 | 12 | 92.3 | 1 refusal (7.7) |

Table 3
Perceptions and misperceptions of the English vowels

The following table identifies those English vowels that Korean listeners of English had most difficulty in perceiving accurately from an educated British speaker.

| Vowel | Misperception (%) |
|-------|-------------------|
| 1. ɔ: | 69.2 |
| 2. ʊ | 53.8 |
| 3. ʌ | 47.7 |
| 4. I | 38.5 |
| 5. ɒ | 23.1 |
| 6. æ | 17.3 |
| 7. ε | 12.8 |

Table 4

The evidence largely bears out the result of the earlier experiment in that it is the short vowels (but not /ə/) that are the trickiest in perception terms. However, one unexpected difference was the degree of troublesomeness of the vowel /ɔ:/; only 2 of the subjects interpreted /bɔ:t/ correctly as *bought*; 2 were undecided between *bought* and *boat* (i.e. 2 x .5 correct judgments); 1 interpreted the signal as *board*, but at least perceived the vowel correctly; and 8 perceived the vowel as /əʊ/ (*boat*).

The vowels /ɜ:/, əʊ, uə, ɪə, i:/ were very well perceived, there being only a single isolated case of misperception for each. All-correct judgments were recorded for /u:, ə, eɪ, aɪ, aʊ, ɔɪ/.

The evidence from the two experiments suggests that the major discrimination problems for Korean learners of British English are as follows, and that pronunciation pedagogical strategies need to be concentrated on:

- 1 /ʌ/ in contrast with /æ, ɑ:/, ɒ, ɜ:/
- 2 /ʊ/ in contrast with /u:/
- 3 /ɪ/ in contrast with /i:/, ɛ/
- 4 /ɒ/ in contrast with /ɔ:/
- 5 /ɔ:/ in contrast with /əʊ/
- 6 /æ/ in contrast with /ɛ, ʌ/
- 7 /ɛ/ in contrast with /æ/

The difference in British and American accents no doubt accounts for 6 and 7 above, and may, possibly, contribute to 4 and 5 as well.

It should also be noted, however, that the fact that the long vowels (except /ɔ:/, the diphthongs and /ə/ posed no real problems in **perception** is no guarantee that they pose no problem in **production**.

ii) Consonants

The word list does not, unfortunately, include all consonant phonemes in all positions. It should be remembered that this word list was one of a set of 5 which were designed to test intelligible production. This particular list is therefore not all-inclusive and omits what, in hindsight, might have been considered crucial. Nevertheless, every consonant is included, as are 8 initial and 6 final clusters.

The CA set up certain expectations, since

- i) no equivalents of /f, v, θ , ð, z, ʒ/ are found in Korean,
- ii) [l] and [r], and [s] and [ʃ], are allophonic variations of a single phoneme respectively,
- iii) Korean [l/r] does not occur initially,
- iv) English /b, d, g, dʒ, s, r/ do not have identical articulatory characteristics with their nearest equivalents in Korean;
- v) Korean final obstruents are limited to unaspirated/unreleased varieties of /p, t, k/ and
- vi) Korean does not allow consonant clustering in final position, and only limited clustering with [j] and [w] in initial position.

The table below provides the available evidence from the experiment in the misperceptions of initial consonants. English /t, d, ʃ, h, m, sp, str/ were perceived correctly, although it has to be admitted that /ʃ/ was only tested before /i:/.

| Degree of misperception of initial consonants | | |
|---|-------------------------|---------------------|
| % correct perception | misperceptions (with %) | |
| b - | 83.1 | v (16.9) |
| p - | 84.6 | f (15.4) |
| k - | 88.5 | g (11.5) |
| v - | 92.3 | b (7.7) |
| l - | 92.3 | r (7.7) |
| r - | 92.3 | l (7.7) |
| w - | 92.3 | r (7.7) |
| | | |
| | | |
| sf - | 23.1 | sp (76.9) |
| fr - | 69.2 | fl (30.8) |
| fl - | 84.6 | fr (15.4) |
| br - | 84.6 | bl (7.7), gr (7.7) |
| kl - | 88.5 | k l (7.7), kr (3.8) |
| pj - | 92.3 | - (7.7) |

Table 5

The results - apart from /sf- / and /fr- / - are very encouraging. One very noticeable feature is that in most cases the misperception involves only one substitution; this is quite different from the cases in final position (see below). The main perceptual problems in initial position are indeterminacy between pairs of consonants as follows:

$$\begin{aligned} b &\sim v \\ p &\sim f \\ k &\sim g \\ l &\sim r \end{aligned}$$

and clusters, as follows:

$$\begin{aligned} fr &\sim fl \\ br &\sim bl \end{aligned}$$

The cluster /sf/ is the major problem, by far; however, in English the occurrence of the cluster is limited to a few technical terms of Classical and Italian origin, the most common of which are *sphere* and *sphinx* and their derivatives.

Two of the 13 subjects interpreted *claps* as *collapse*, but no other breaking of a cluster by imagined epenthesis was noted.

On the whole, perception of English initial consonants and clusters was good; the only serious problem concerned clusters which included /f/.

The evidence of misperceptions in intervocalic position is too limited to generalise from, but the fact that nearly half of the subjects interpreted /-s-/ as /-θ-/ is noteworthy, especially in view of the additional gloss that had been provided (*looser*, ie ‘more loose’).

Problems in final position are more significant in both range and complexity of misperceptions. The sonorants, however, prove unproblematic: /l, m, n/ were perceived correctly throughout and /ŋ/ was misinterpreted by only one of the 13 subjects, and even that seemed to be a case of lexical re-interpretation on account of the vowel perceived (*turn* for *tongue*, exactly as in the trial experiment).

The major problem is the recognition of obstruents, both voiceless and voiced. As noted above, not only does Korean have a very limited set of fricatives, but none of them appear in final position and although there is a rich system of plosives and affricates, there is a severe limitation on their occurrence in final position: only unaspirated/unreleased varieties of /p, t, k/. Nevertheless - and surprisingly - final /k, g/ were both perceived totally correctly; this is surprising in view of the total

omission of /g/ in the trial experiment, and in view of the difficulties encountered with the other plosives /p, b, t, d/ in both experiments.

The misperceptions in final position appear in the table below:

| Degree of misperception of final consonants | | |
|---|-------------------------|-----------------------------|
| % correct perceptions | misperceptions (with %) | |
| - s | 23.1 | θ(57.7), z (7.7) |
| - ð | 38.5 | d (38.5), v (15.4), z (7.7) |
| - z | 76.9 | s (23.1) |
| - θ | 76.9 | s (23.1) |
| - f | 76.9 | p (15.4)m ft/t (7.7) |
| - p | 76.9 | f (23.1) |
| - tʃ | 84.6 | dʒ (7.7), tʃə (7.7) |
| - dʒ | 84.6 | z (15.4) |
| - ɳ | 92.3 | n (7.7) |
| - d | 92.3 | z (3.8), n (3.8) |
| - t | 96.7 | ts (3.3) |
| | | |
| | | |
| - lb | 30.8 | lv (38.5), b (23), b (7.7) |
| - ps | 53.8 | bz (38.5), sp (7.7) |
| - lt | 84.6 | ld (7.7) |
| - st | 96.2 | t (3.8) |

Table 6

We might account for the extreme difficulty with final / -s/ in terms of both distributional and realizational differences in the two languages. Neither Korean /s/ nor /s*/ (fortis) occur in final position; furthermore, Korean /s/ is lenis, whereas its English counterpart is fortis. The Korean ‘filter’ is ‘pre-set’ against the discrimination of final apical fricatives despite the opposition in voice and sibilance systems. It is significant that English /θ, ð, s, z/ occupy the top four places in the table of misperceptions in final position.

Indeterminacy is shown mainly in pairs of segments amongst the other obstruents, but not in quite the same clear-cut fashion as in initial position. Taking into account both single consonants and clusters, the same kind of pattern emerges amongst the labials:

$$\begin{array}{l} p \sim f \\ b \sim v \end{array}$$

The affricates are managed less systematically: occasional deviations in voice (*perch* heard as *purge*), related manner of articulation (*badge* heard as *buzz*), and imagined paragoge (*perch* heard as **furture*). The release mechanism of English plosives and affricates does clearly lead to misinterpretation, as noted in the trial experiment, eg the above case of imagined paragoge, final /t/ as /ts/, /d/ as /z/, and *bulb* as **Bauber*. (It is also a well known feature in the Korean production of English final affricates, that they are pronounced with paragoge; thus a common Korean pronunciation of the English words *itch* and *edge* sound to English listeners as *itchy* and *edgy*.) Even the final fortis friction of /f/ led one subject to imagine a closure with /t/, viz. **stri(gh)ft*.

iii) re-interpretation within an interlanguage lexicon

The subjects in the second experiment showed the same evidence of lexical re-interpretation as a result of a segmental misperception: it is often the case that a single phonological misperception leads to a lexical re-interpretation that is a further remove from the original signal. Thus, as in the trial experiment, the perception of /æ/ as /ʌ/ led one subject to imagine a closing /t/ - *mass* heard as *must*; it led two to interpret *badge* as *buzz*, and another *mad* as the invented **muz*. /æ/ was also perceived by one subject as /ɛ/: *mad* heard as **med*. The /ʌ/ was, again, perceived by one subject as /ɜ:/, yielding *turn* for *tongue*. /ɪə/ also, once again, was perceived by one subject as /ɪ/:

sphere, with the additional problem of /sf- / highlighted above was heard as *spin*, with an imagined /n/. *Hiss* produced again the same varieties as in the trial experiment. *Rope* was interpreted as *roof* and *loaf*; in the trial experiment, as *roof* and *loop*.

There were also additional instances of re-interpretations. One subject perceived the final / -st/ in *waste* as / -zd /; since there is no /weɪzd/ in the lexicon, it was re-interpreted by switching the initial /w/ to /r/; such a substitution had occurred in the trial experiment, viz *reed* as *weed*. The /ɪ/ of *kilt* was perceived by one subject as /i:/: but since there is no /ki:lt/ or /ki:t/ in the lexicon, the vulnerable final plosive was re-interpreted as /p/ to yield *keep*. The case of *grieve* for *breathe* was described earlier, under *Processing items from a word list*. Another subject, however, interpreted *breathe* as *bleed*; this might have come about as a first attempt at /bli:ð/, which does not match anything in the lexicon, and was then re-interpreted as *bleed*, since a good deal of indeterminacy exists over /bl/ and /br/ as initial clusters.

The case of initial /b/ in *bulb* and *buzz* is interesting. Apart from the case of *grieve*, the only alternative perception to / b / in any of the items (*bought*, *bite*, *badge*, *breathe* as well as *bulb* and *buzz*) is /v/. However, no /v/ is perceived in *bought* or *badge*,

presumably because there is no **voight/voard* or **vadge/vudge* possibility in the lexicon; in the case of *bite*, there is no **vite* either, although one subject invented it, presumably as a back formation from *vital* or *invite*. The /v/ alternative only emerges with *bulb* where it does very strongly in initial position (8/13) and final position (5/13), and with *buzz* (2/13). The problem seems to derive from the vowel /ʌ/ in both cases; if /ʌ/ is perceived as /ɒ/, a lexical search for **bolb* fails; a second search leads to a re-interpretation which yields **volve*, presumably a back formation from *involve*, etc. The conjectured processes are displayed in the following table.

| Perception of /ʌ/ as | Failed first lexical search | Re-interpretation | No. of cases |
|----------------------|-----------------------------|-------------------|--------------|
| /ɒ/ | *bolb | *volve | 4 |
| /ɜ:/ | *berlb | verb | 3 |
| /æ/ | *balb | valve | 1 |
| /ɜ:/ | *berz/se | verse | 1 |
| /ʌ/ | buzz | *vuzz | 1 |

Table 7

One can only speculate that in the last case in the above table, that either the one subject did not know the English (onomatopoeic) lexical item or had always interpreted the onomatopoeia as **vuzz*.

iv) judgement refusal

In the second experiment there was only one refusal to commit to a judgement, and that was against the item *pure*. This appears surprising as all the other subjects interpreted the word correctly, and it was not one of the items avoided by Subject 3 in the trial experiment - although he did misinterpret it as *pour*. An initial consonant + /j/ + vowel is a common sequence in Korean; one can only guess that the vowel /uə/ misled the subject, who might possibly have expected an American final /r/ to guide him to the right interpretation.

Evidence of misperceptions in a supplementary experiment

A third experiment was conducted to supplement the second, in order to gain missing information. The original word list happened not to contain the vowels /ɑ:/ and /ɛə/; the supplementary list included them in the items *chart* and *share*. As it happens, no problems in perception emerged in these cases, just as anticipated.

More seriously, the original word list did not include all consonants in both initial and final word positions, and this was totally remedied in the third experiment. Items were selected to ensure that /g, θ, ð, s, z, n, tʃ, dʒ, j/ occurred in word-initial position and that /ʃ/ occurred before a vowel other than a front close vowel; items were also selected to test the perception of /b, v, ʒ/ in word-final position and one item, *breezy*, to test whether the subjects perceived the difference between final /z/ and /ʒ/ followed by unstressed [i]. It was also important to collect evidence for the perception of consonants in intervocalic position, specifically the contrasts: /b ~ p/, /f ~ p/, /v ~ f/, /d ~ t, ð/, /g ~ k/, /s ~ θ/, /ʒ ~ z/, /l ~ r/.

The experiment was conducted in similar fashion to the second, but with only 10 subjects. On checking their acquaintance with the words as lexical items, it did emerge that half of them did not know the item *seep*; all the other words were well known, although almost to a person the words *mesh*, *yeast* and *composure* were misinterpreted. Astonishingly, *youthful* too was misinterpreted by the majority as *useful*, even though the latter had already figured in the list and had been interpreted correctly by all but one; no doubt this accounted also for the one judgement refusal.

The results of the third experiment are summarized in the Table 8.

Table 8 here

i) Vowels

The vowel /ɔ:/ was, again, least well perceived, being interpreted either as /əʊ/ or /ɒ/. The short vowels also proved to be most troublesome; the total failure to recognize *mesh* is no doubt the consequence of earlier exposure to North American English, which would also account in part for the confusion in interpreting *bury/berry* correctly.

The long vowels (other than /ɔ:/) and the diphthongs were perceived relatively well, with subjects displaying indeterminacy only occasionally between /i:/ and /ɪ/, between /əʊ/ and /ɜ:/, /ʌ, u:/, and between /eɪ/ and /ɪ/, /æ/, but in most of these cases, reference must be made to restricted interlanguage lexicons.

ii) Consonants

The consonants /g, ð, z, n, tʃ/ caused no problems in initial position; not one subject misinterpreted the items with their corresponding minimal pair. /ʃ/ proved unproblematical before a vowel that was not front and close; /dʒ/ was misinterpreted by one subject only.

The problem cases in initial position were

- 1 /s/ before a front close vowel. The equivalent in Korean would result in the allophonic realization [ʃ] and this would account for the 30% interpretation of *seep* as *ship* - interestingly, not as *sheep*! Only 40% perceived it correctly as /s/, the remaining 30% re-interpreting the item as *thief*, having no doubt been led astray initially by construing final /p/ as /f/.
- 2 /θ/. Although 70% perceived it correctly, a worrying 30% misinterpreted what is, after all, a very common lexical item. The indeterminacy between initial /θ/ and /s/ before front close vowels was also displayed in responses to *seep*. There is no clear pattern amongst the subjects; the three subjects who ‘heard’ /s/ for /θ/, ‘heard’ *seep* as *sip*, *thief* and *ship* respectively.
- 3 /j/ before a front close vowel. Only one subject perceived the /j/ in *yeast*, and even that subject was undecided between *yeast* and *east*. The sequence /ji:/ is not permitted in Korean; thus Korean ears are not ‘trained’ to detect /j/ in this environment. Fortunately for Korean learners of English, there are not many cases of this sequence in English: *yeast*, *year*, *yield*, of which only the first two have minimal pairs without /j/. Items with /ji-/ in English do not have minimal pairs in contrast with them.

In intervocalic position, the consonants /g, v, r/ were well perceived; nobody mistook *anger* for *anchor*, or *rival* for *rifle*, or *bury/berry* for *belly*. Only one subject mistook the /l/ of *pilot* for /r/, or the /b/ of *stable* for /v/ (but /p/ was anticipated). In this experiment, only one subject misperceived *useful* (as it happens, for *usual*); two mistook intervocalic /z/ as /dʒ/. The main problems were

- 1 /f/. Exactly half the subjects interpreted *defend* as *depend*.
- 2 /θ/. 90% misheard *youthful* as *useful*. Only one subject was confident enough to distinguish the two; 7 subjects wrote *useful* for both items; one subject refused to commit himself to anything in item 24, having heard *useful* already in item 19. The subject who heard *useful* as *usual*, and *youthful* as *useful* had not revised the earlier entry at item 19 in the light of item 24; they both seem to be genuine cases of misinterpretation.
- 3 /ʒ/. 80% misheard *composure* as *composer*, although one of them was undecided between the two. A later check confirmed that both words were known.
- 4 /d/. Most surprisingly, only one subject heard this aright. 80% interpreted intervocalic /d/ as /ð/, primarily as *rather*. It is difficult to tell whether the

/l ~ r/ problem or the /d ~ ð/ problem was initially to blame for the re-interpretation. However, the fact that three other subjects perceived initial /l/ correctly and intervocalic /d/ incorrectly seems to indicate that the latter was the prime problem. Quite possibly, earlier exposure to the North American voiced allophone of /t/ accounts for the one subject's choice of *latter*.

The missing evidence for consonants in final position now simply confirms the vulnerability of obstruents in that position. Final /b/ was only perceived correctly 50% of the time and final /v/ only 60%. The evidence for final /ʒ/ is difficult to decipher; the meaning of *beige* was known, but evidently not its spelling. The subjects' <dge> offerings unambiguously represent a perception of /dʒ/, and their <sy> and <zy> suggest paragoge. The spellings <bage> and <baze> are the evidence of correct perception. *Vain* is clearly a re-interpretation. At best, one can assess correct perception at only 30%.

Final /z/ was simply not heard by one subject for the item *those*. Of greater interest, is the evident confusion between final unstressed /zi/ and final /z/. The final unstressed syllable was perceived by only three subjects, of whom only two perceived it correctly. The remaining seven subjects ignored final /i/, as if it was merely the completion of the preceding /z/ (or /dʒ/) articulation.

iii) re-interpretation within an interlanguage phonology

Evidence in the third experiment has already been alluded to; for instance, *robe* was interpreted by one subject as *vogue*, *seep* by three as *thief*, *thick* by one as *seek*, *ladder* by 6 as *rather* and by one as *leather*, *stable* by one as *Steven*, *breezy* by one as *bridge*, and *pilot* by one as *tired*. There is of course no **vobe*, **thiep*, **thheck*, **stavle*, **breedge* or **pired* in English, and presumably no *lather* or *larder* in the restricted lexicon. Nevertheless, a number of other items were invented, which are useful evidence in interlanguage phonology.

iv) judgment refusal

Just one refusal was noted. Having correctly interpreted *useful* in item 19, one subject was reluctant to commit himself to any interpretation of the signal *youthful* in item 24, presumably because, although he might have heard it as *useful*, he considered it most unlikely that that item would be repeated.

Review

By gathering the data from all three experiments, we can produce a comprehensive review of all the vowels and consonants that Korean learners of British English have difficulty in perceiving.

i) Vowels

Table 3 which listed all the correct and incorrect perceptions of British vowels in Experiment 2 needs very little amendment when Experiments 1 and 3 are also taken into account, apart from the addition of the all-correct perceptions of /ɑ:/ and /ɛə/. The amendments will simply be noted for the vowels that generate the greatest degree of misperception; thus Table 4 is revised as Table 9, below.

| | | |
|----|------|--------------|
| ɔ: | 30.8 | əʊ, ɒ |
| ʊ | 50 | u: |
| ʌ | 51 | æ, a:, ɒ, ɜ: |
| ɪ | 69 | i: |
| ɒ | 75 | ɔ: |
| ɛ | 75.6 | æ |
| æ | 76.2 | ɛ |
| əʊ | 87.5 | u: |

Table 9

Percentage of correct perceptions of the most difficult vowels,
with their major perceived alternatives

The pedagogical implications are clear; English teachers need to concentrate on developing discrimination of these vowels in specific contrasts as indicated. It is the short vowels that need attention, not the long vowels or diphthongs except /ɔ:/ and /əʊ/. The neutral vowel /ə/, it might be added, causes no problem.

Consonants

In the case of the consonants, fuller tables are required since Experiment 3 supplemented quite substantially the data from Experiments 1 and 2. The data is still not as comprehensive as we might wish, since evidence is lacking of /k, ɒ/ and the affricates in medial position. However, /k/ does not appear to present much of a

problem in either initial or final position, nor the other voiceless plosives in medial position. The affricates do not appear to present much of a problem in either initial or final position, and interestingly, do not appear to be much confused with each other. /ð/ is, perhaps surprisingly, not a problem in initial position, although it is easily confused with /d/ in final position; however, it replaced /d/ in intervocalic position in 80% of cases, and so it could possibly be argued that it itself would not constitute a problem in that position. /h, j, w/ are not treated separately in medial position, since when they do occur there, they usually act as onsets to stressed syllables. A comprehensive review of the perceptions of single consonants appears in Table 10.

| | Initial | medial | final |
|------------|---------|--------|-------|
| p | 87.2 | 100 | 69.2 |
| b | 81 | 90 | 50 |
| t | 100 | 100 | 97.1 |
| d | 100 | 10 | 90.6 |
| k | 100 | n/a | 96.1 |
| g | 100 | 100 | 80.8 |
| f | 96.9 | 50 | 75 |
| v | 81.3 | 100 | 60 |
| θ | 70 | 10 | 68.75 |
| ð | 100 | n/a | 37.5 |
| s (s + i) | 40 | 69.2 | 21.9 |
| z | 100 | 80 | 80.8 |
| ʃ | 100 | n/a | 100 |
| ʒ | - | 63.5 | 25 |
| tʃ | 100 | n/a | 87.5 |
| dʒ | 90 | n/a | 93.75 |
| h | 100 | - | - |
| m | 100 | 100 | 100 |
| n | 100 | 100 | 100 |
| ŋ | - | 100 | 87.5 |
| l | 91.75 | 90 | 94.2 |
| r | 86.5 | 100 | - |
| j (j + i:) | 5 | - | - |
| (j + u:) | 95 | - | - |
| w | 93.75 | - | - |

Table 10

Percentage of correct perceptions of single consonants
in all experiments

Clusters, it must be conceded, have not been handled as systematically as single consonants. Table 11 reviews the evidence from all three experiments, but not all combinations have been tested, and fewer final consonants than initial. Nevertheless, some generalizations are included in the discussion below.

| initial | final |
|---------|----------|
| st 100 | st 97.6 |
| sp 100 | ps 62.5 |
| sf 23.1 | ts 100 |
| br 84.6 | lt 87.5 |
| kl 90.6 | lb 31.25 |
| fr 69.2 | nd 100 |
| fl 84.6 | |
| pj 87.5 | |

Table 11

Percentage of correct perceptions
of clusters in all experiments

One major pedagogical implication is the need to concentrate discrimination exercises on consonantal contrasts in final position. Table 12 clarifies.

| initial | medial | final |
|---------|--------|-------|
| 87.75 | 78.91 | 71.28 |

Table 12

Percentage of correct perceptions of all single
consonants in all experiments

Detailed discussion now follows

a) plosives

The voice distinction in English plosives is well perceived despite the very different plosive system in Korean; the only troubles appear in final clusters: /p/ is occasionally mistaken for /b/ in /ps/, and /t/ for /d/ in /ts/. The major problem is the susceptibility of /p, b/ suffering from an over-correction tendency of some learners with /f, v/. Also, some learners have difficulty in hearing the presence of final /g/, and others over-react to the release of /p, t, k/ in final position, which sounds unduly prominent to Korean ears.

b) affricates

Again, the voice distinction in English affricates is well perceived. Some learners show indeterminacy between /dʒ/ and /z/ in initial and final positions. Again, some learners over-react to affricate release in final position, but in this case imagine an extra unstressed syllable.

c) fricatives

Generally speaking, the voice distinctions in English fricatives cause no problems. /f, v/ are not confused with each other but with /p, b/ initially, medially, finally and in clusters. Similarly, /θ, ð/ are not confused with each other, but /θ/ with /s/ (not /t/), in all positions, and /ð/ with /d/ (not /z/) in medial and final positions; note the asymmetry. /s/ is confused with /θ/ (not /z/) in all positions, but also with /ʃ/ in initial position before front close vowels. /z/ is perceived well in initial position, but in final position, some learners either do not hear it or confuse it with /s/; final /z/ followed by /i/ causes considerable problems: for many the /i/ is treated simply as the completion of a /z/ or /dʒ/ articulation.

/h/ causes no problem.

d) nasals

There are no major perception problems with English nasals.

e) liquids

/l/ and /r/ are generally distinguished very well by adults with some exposure to English. This, however, might be the result of intensive practice at school. In initial position, they are heard quite distinctly, with only occasional evidence of indeterminacy. In medial position - where Korean [r] occurs - English /r/ is no problem at all, and /l/ only occasionally. In final position - where Korean [l] occurs - English /l/ is no problem, although it may sometimes not be heard. The more significant problems in perceiving the distinction between /l/ and /r/ lie in their membership of initial clusters; the percentages for correct perception of /br, fl, kl/

are noticeably lower than when they appear as single consonants. (British /r/ does not occur finally, either singly or in clusters; this eliminates a problem that might occur in the perception of North American final /l/ and /r/ ; however, Borden, Gerber & Milsark (1983, 1985) confine their attention to initial position only, even in a North American context.)

f) semivowels

The English semivowels /j, w/ are generally well perceived, although there may be occasional confusion between /w/ and /r/. However, there is a major problem when /j/ is followed by a front close vowel; it appears simply not to be heard at all.

This detailed discussion of pedagogical implications shows the value of conducting educational research into learners' perceptions of the pronunciation system of a target language. Perception tests are not only valuable tools in the classroom for diagnostic purposes (see, for example, Bowen & Marks, 1992, Dalton & Seidlhofer 1994, Celce-Murcia et al, 1996) but also as a research tool for establishing a current state of interlanguage phonology, with implications for the design of teaching materials. A teacher cannot really expect good production of sounds without good perception of them: "faulty perception leads to faulty articulation" (Tench, 1981: 46).

The design of a perception test - whether for research or classroom exercises - is based on a thorough contrastive statement of the phonologies of the two languages concerned and on (even casual) observation of learners' attempts in the target language. The value of the latter, a kind of error analysis, is in supplementing the evidence from a contrastive analysis. Learners' strategies in target language pronunciation might involve issues that a phonological contrastive statement might miss, e.g. reference to orthography, choice of substitutions - some learners of English substitute /θ/ with /t/, others with /s/, for instance - use of either reduction or epenthesis in coping with unfamiliar clusters, and of paragoge in coping with unfamiliar codas.

What emerges from the contrastive study and the observation of errors is a list of problematical segments together with their most likely alternatives. It must be borne in mind, that some segments are not problematic in certain environments but are so in others, e.g. English /j/ for Korean learners, but only before front close vowels. A list of minimal pairs is drawn up, matching the problematic segment with their alternatives; a list of items is thus drawn up which contains the problematic segments. Depending on the scale of the testing event, a number of parallel lists might be advisable, as Tench (1996) and Ahn (1997) have done. Furthermore the items must be carefully selected to avoid the risk of learners finding a semantic link between the items, and the risk of confusing spellings; for instance, if you choose *bow* /bau/, you have no way of knowing from the testee's written response whether /au/ or /əu/ was

perceived. Also, the items selected must be reckoned to belong to the (interlanguage) lexicon of the learners. This reduces the risk of multiple re-interpretations which inevitably distort the evidence of the real phonological competence; for instance, *seat* would certainly have provided more satisfactory evidence in Experiment 3 than *seep* did, being a more familiar word which still has the potential for confusion with /ʃ/ + /i:/.

The perception test can be administered as described above; each item is given twice, from a point where lip action cannot be detected, with a control subject present. The analysis is most revealing! As is often the case in the classroom, what the teacher presents is not always what the subjects perceive - in phonology too! In the data presented above, the author was quite unprepared for the revelation that most people mistook *mass* for *math*. Allowing for cases of re-interpretation within the interlanguage lexicon, the results are a clear indication of the current state of receptive phonological competence, which thus provides the basis of the design of necessary remedial discrimination procedures.

It should be noted, too, that this evidence of phonological interlanguage is both general and individual. The above pedagogical discussion leads to the design of classroom materials, but for an individual more specific practice can be organized. Subject 1 in Experiment 1 needs practice in medial and final /s/, to distinguish it from /θ/, and in the distinction of the vowel /ʌ/ from /ɒ/; Subject 2 needs much more.

Naturally, the larger the sample, the more reliable the evidence, which might lead to the publication of discrimination exercises for specific groups of speakers: in the case reported in this study, adult Korean learners at an upper intermediate/lower advanced level in a professional setting. Such evidence, along with the kind of intelligibility evidence reported in Ahn (1997), would also inform the design of articulation exercises. The two kinds of material - perceptual and productive - would thus carry a strong guarantee of effective development of the phonological competence of those that are trained by it.

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Table 1

Table 2

Table 8