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COMPLEX CONTRASTIVE ANALYSIS

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1. It is a commonplace that foreign language learners perceive the sounds of the foreign language through the filter of their sound system and, when speaking, they tend to substitute their closest equivalents for the foreign language sounds. Thus, a contrastive analysis of the sounds systems of the two languages in question may predict what pronunciation errors the learners will make.

2. When comparing the location of the English (RP) and Eastern Norwegian vowels in the Universal Vowel Space (UVS), the analyst may predict, for example, that Norwegian learners will substitute the Norwegian /i/ as in *bitt* 'bite' for the English /ɪ/ as in *bit*. These two vowels are located in the same area:

Norwegian	English
/i/	/ɪ/
CLOSE lowered	HALF-CLOSE raised
FRONT retracted	CENTRAL advanced

Yet the substitution of the Norwegian /i/ for the English /ɪ/ is a serious error and may lead to misunderstanding. The Norwegian /i/ will be perceived as the English /i:/ since length is not the primary distinctive feature in English. For example, if in the sentence: "Tears came from beneath her lids" the word <lids> [lɪdz] is mispronounced as *[lɪdz], it will be perceived as [li:dz] 'leads', i.e.: "The tears came from beneath her leads".

The analyst may also predict that Norwegian learners will substitute the Norwegian [FRONT retracted; HALF-CLOSE lowered] vowel /ø:/ as in *pøs* 'bucket' for the English [CENTRAL] vowel /3:/ as in *purse*. These two vowels are neighbors in the UVS and the substitution seems to be natural.

3. However, Norwegian learners also make unpredictable pronunciation errors. Norwegian has an [OPEN; BACK advanced, almost centralized] vowel /a/ as in *natt* 'night'. This vowel is a close neighbor of the English [OPEN raised; CENTRAL advanced] vowel /ɐ/ [= /6/ in IPA] as in *nut*. Comparing the location of these two vowels in the UVS, the analyst may hypothesize that Norwegian learners will substitute the Norwegian /a/ for the English /ɐ/. But contrary to the analyst's prediction, Norwegian learners often substitute another Norwegian vowel, namely /9/ as in *lønn* 'salary', which is a [HALF-OPEN lowered; FRONT retracted; slightly ROUNDED] segment. Several explanations, like the influence of spelling (cf. Nilsen 1996, 119), have been offered to account for this unpredictable error, but none of them sound convincing.

4. Here the analyst will have to turn to the acoustic analysis in order to explain why Norwegian learners substitute the Norwegian /9/ rather than /a/ for the English /ɐ/. The analyst fails to predict the learner's error if he relies "too heavily on phonetic studies that compare the sounds of different languages without making use of objective acoustic analysis" (Lieberman and Blumstein 1988, 181). Below are the values of the two first formants for the three vowels in question, i.e., the Norwegian /9/ and /a/ (cf. Kristoffersen 2000, 16) and the English /ɐ/ (cf. Gimson 1989, 100):

	F1	F2
English /ɐ/	760	1,320
Norwegian /9/	404	1,326
Norwegian /a/	602	999

It may be hypothesized that the almost identical values of the second formant for the English vowel /ɐ/ and the Norwegian vowel /9/ is the factor that has a decisive influence on the Norwegian learners' choice of the closest equivalent of the English vowel /ɐ/.

Therefore a contrastive analysis should take into account both the articulatory and acoustic aspects of speech since the representation of the articulation of vowels in terms of, for example, the mean tongue positions, "is not as close to the usual linguistic representation of these vowels as is that provided by the acoustic data" (Ladefoged and Maddieson 1996, 284).

5. The analyst may face yet another problem. In Danish the vowel /9/ has a lowered variant [&] which occurs before /r/ and between /m n v/, e.g., *smør* [sm&r] 'butter'. This variant is very similar to the Norwegian variants of /9/, but Danish learners do not substitute their [&] for its English neighbor /ɐ/. Those Danish learners who have an /Θ/-like vowel in their dialect, for example in *lok* 'lid', use this vowel for both English /ɐ/ as in *cut* and /Θ/ as in *cot* (cf. Livbjerg and Mees 1997, 160). The substitution of the Danish [&] for the English [ɐ] is not reported even in those contexts in which [&] occurs, e.g., the learners will mispronounce *rum* [rɐm] as *[rΘm], but not as *[r&m].

In my opinion, this 'non-substitution' of the Danish [&] for the English /ɐ/ is an example the application of Sapir's principle, i.e., that learners perceive phonemes, but not phonetic variants: " ... I have come to the practical realization that what the naive speaker hears is not phonetic elements but phonemes" (Sapir 1933 [1972, 23]). The main variant of the Danish /9/ is too far away from the English /ɐ/ in the UVS: the Danish / 9̝ /is [HALF-OPEN raised], while the English /ɐ/ is [OPEN raised] and therefore Danish learners do not substitute their [&] for the English /ɐ/. In Norwegian the main variants of the vowel /9/ are very close to the English vowel /ɐ/ in the UVS and that is why Norwegian learners tend to substitute their /9/ for the English /ɐ/ (cf. Awedyk 2002).

6. The acquisition of the foreign sounds system is a complex cognitive process. It involves a number of factors such as phonetic similarity, both in articulatory and acoustic terms, and systemic, i.e., phonemic, which influence the learner's perception and, consequently, production. The foreign language sounds are passed through a sieve of the native sound system which sifts out the equivalent segments. What segments are sifted as equivalent may sometimes surprise the analyst since there are more things in language than are dreamt of in our linguistic theories.

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