THE POLISH AND ENGLISH FRICATIVES — A PROBLEM IN PHONOLOGICAL EQUIVALENCE

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The theory of the phoneme in its classical form actually contradicts identification of phonemes across language boundaries stressing differences and all but ignoring similarities between languages.

Weinreich (1953) obviates the question of phonological equivalence by a strict division of language into form and substance and assignment of phonic interference to the level of substance ("structural no man's land"). This does not, of course, mean that he excludes the theory of the phoneme in considering languages in contact (cf. e.g. his first three types of phonic interference).

Haugen (1954, 1956, 1957) makes a step forward by expanding the notion of the phoneme to include the bilingual phoneme, the diaphone, according to which the identification of the phonemes of a target language is effected through a physical similarity of allophones and their assignment to the phonemes of the native language, e.g., a Pole identifies the English glottal /h/ with the Polish velar /x/ enriching, as it were, the Polish /x/ phoneme by an additional "bilingual allophone". The three types of diaphones posited by Haugen are thus an attempt at accommodating the theory of the phoneme to the synchronic comparison of phonological systems of different languages.

Catford (1965) makes a distinction between translation equivalence and formal correspondence. Translation equivalence in phonology is "the relation of the SL and TL phonological units to the same phonic substance". His formal correspondence refers to the equation of those phonemes in the two languages that occupy the "same" place in the phonological systems of the compared languages. The latter is apparently determined by parallel oppositions and the number of terms in the compared subsystems.

Milewski (1962) seems to offer the most explicit treatment of phonological equivalence (Catford's formal correspondence) and we will examine it in greater detail. He bases his notion of phonological equivalence on the theory of phonological oppositions saying that "equivalent are those

phonemes that occur in identical positions in identical oppositions, whereas non-equivalent are those that do not occur in any identical oppositions" (Milewski 1962 : 13). E.g. P(=Polish) and AE(=American English) (p) may according to this definition be considered as equivalent because they occur in the same positions in the oppositions:

labial stop : dento-alveolar stop	/p/ : /t/
labial stop : velar stop	/p/ : /k/
labial stop : labial fricative	/p/ : /f/
labial stop : labial nasal	/p/ : /m/

and although P /p/ occurs additionally in the opposition

labial stop : palatal stop	/p/ : /c/.

In other words for phonemes to be considered equivalent it is sufficient that they appear only in **some** identical oppositions and not **all** of them. Phonemes that appear in identical oppositions alone would be considered identical, which is impossible if we are concerned with comparing two different systems. Thus equivalence of phonemes is here defined as partial rather than complete identity.

On the other hand, P /c/ is non-equivalent to any of the AE phonemes because there is no phoneme in AE that would fill the left position in the oppositions:

palatal stop : dento-alveolar stop	/c/ : /t/
palatal stop : labial stop	/c/ : /p/ etc.

It also follows from the definition that equivalent phonemes must have certain features in common.

Milewski's definition, without imposing too many constraints to render the comparison impossible, seems to constitute a sound scientific basis and, at the same time, it consistently follows from the theory of the phoneme. However, in practical application it creates a number of difficulties and shows some weakenesses. P and AE fricatives may serve as an example.

	AE		P		EQUIVALENT
LABIAL	f	v	f	v	+
DENTAL	Θ	ð	s	z	+
ALVEOLAR	s	z	ʃ	ʒ	+
PALATAL	ʃ	ʒ	ɕ	ʑ	+
VELAR			x		−
GLOTTAL	h				−

It will be seen that a mechanical juxtaposition according to Milewski's principle (in terms of traditional articulatory features) gives baffling results because AE /Θ ð/ appears to be equivalent with the P /s z/, AE /s z/ with P /ʃ ʒ/ and AE /ʃ ʒ/ with P /ç ʑ/. Such juxtaposition contradicts the native speaker's intuition and is contrary to the condition of naturalness. This interpretative difficulty may be partially avoided by applying a subdivision into fricatives and sibilants. Such subdivision is feasible on the basis of the following articulatory differences:

(a) double friction — at the place of articulation and at the teeth

(b) and/or grooved shape of the tongue in the sibilants.

Fricatives may be defined negatively as constrictives that do not have these features. One problem is solved this way.

	FRICATIVES				SIBILANTS				EQUIVALENT
	AE		P		AE		P		
LABIAL	f	v	f	v					+
DENTAL	Θ	ð					s	z	−
ALVEOLAR					s	z	ʃ	ʒ	+
PALATAL					ʃ	ʒ	ɕ	ʑ	+
VELAR			x						−
GLOTTAL	h								−

By this operation we render AE /Θ ð/ non-equivalent to the P /s z/, however there still remains the problem of the P and AE /s z ʃ ʒ ç ʑ/ P /s z/ appears to be non-equivalent to any of the AE phonemes, and we are faced with the unnatural equivalences of AE /s z/ to P/ʃ ʒ/ and AE /ʃ ʒ/ to the P /ç ʑ/. Thus, from the point of view of phonological equivalence in terms of the features of the place of articulation a Pole should identify AE /s z/ with P /ʃ ʒ/, and AE /ʃ ʒ/ with P /ç ʑ/. To ascertain the identifications we have made two experiments.

I. A list of 130 English words was prepared and taped by a speaker of AE. It included:

15 tokens of	AE /s/
14 „	„ AE /z/
14 „	„ AE /ʃ/
4 „	„ AE /ʒ/

randomly dispersed among the 130 words.

Each word was read twice. Eight subjects (Polish students of English of varying ages and degrees of proficiency in English) were asked to identify the initial sound of each word and write it down in what would be the ordinary spelling of the heard sound. In the case of (ʒ), the subjects were

asked to identify the word-medial consonant in the final 18 words. The number of tokens subject to confusion were:

AE /s/ ——— 15×8=120
AE /z/ ——— 14×8=112
AE /ʃ/ ——— 14×8=112
AE /ʒ/ ——— 4×8= 32

Results

P

AE	s	z	ʃ	ʒ	ɕ	ʑ
s	100%	–	–	–	–	–
z	–	100%	–	–	–	–
ʃ	9%	–	87%	–	4%	–
ʒ	–	7%	–	93%	–	–

Discussion

1. 100% of tokens of AE /s z/ were identified with P /s z/.
2. It is hard to account for the fact that other than with the P /ʃ/, the AE /ʃ/ was more readily identified with the P /s/ than the P/ ɕ/. Also, 7% of the AE /ʒ/ were identified with the P /z/, and none with the P /ʑ/.
   Other sources (Doroszewski 1938) state that in the dialect of Polish Americans AE /ʃ/ is interpreted as P /ɕ/ in borrowings: shop — siapa /'ɕapa/, finish — finisiować /fiɲi'ɕovat͡ɕ/, moonshine — munsiajn /'munɕajn/, etc.

II. A similar experiment was made with 17 American students. A list of 120 words contained:

9 tokens of P /s/
8 tokens of P /z/
9 tokens of P /ʃ/

The total number of tokens subject to confusion was:

P /s/ ——— 9×17=153
P /z/ ——— 8×17=136
P /ʃ/ ——— 9×17=153

1. P /ʃ/ was identified with the AE /s/ only twice — 1%.
2. No identifications of the P /s z/ with the AE /Θ ð/ were found. This would confirm the correctness of the subdivision into fricatives and sibilants.
3. There is an overwhelming predominance of identifications of:

   P /s z/with AE /s z/ — 93% and 99% respectively
   P /ʃ/ with AE /ʃ/ — 97%

Results

AE

AE	Θ	ð	s	z	ʃ	ʒ	t͡ʃ
s	–	–	93%	2%	5%	–	–
z	–	–	–	99%	–	1%	–
ʃ	–	–	1%	–	97%	–	2%

General conclusions

1. The features of the place of articulation are not as important in the perception of these sounds as it may be claimed. We have assumed — after Tytus Benni (1923) — that the relevant features in the sibilant series in Polish and American English are hissing, hushing and whisper. Thus, these phonemes in P and AE are equivalent and are defined as:

   P, AE /s z/ hissing sibilants
   P, AE /ʃ ʒ/hushing sibilants

   while P /ɕ ʑ/ whisper sibilants are non-equivalent.
   NB on the basis of similar experiments we have assigned the same relevant features to the P and AE affricates on the basis of the manner of release.
   As opposed to hissing, the effect of hushing is characterized by:

   (a) wider constriction between the blade of the tongue and the place of articulation
   (b) a wider groove in the tongue
   (c) a slight protrusion of the lips.

   The whisper effect of the P /ɕ ʑ/ is characterized by:

   (a) an i-shaping of the tongue
   (b) as in the hissing and hushing, a narrowing between the teeth sufficient to produce friction of the air directed toward them through the fronto-palatal construction.

2. From the point of view of methodology the establishment of phonological equivalence is of capital importance since it constitutes a scientific basis for the comparison of phonological system. As we see from the comparison of the Polish and American English systems of fricatives, the establishment of phonological equivalence on the basis of the theory of the phoneme creates difficulties and requires a number of necessary operations (subdivisions, classifications, etc.) to meet the conditions of linguistic intuition and naturalness. Moreover, in the establishment of phonological equivalence we have excluded the question of frequency of phonemes in the text also postulated by Milewski. If we took this restrictive factor into consideration, the picture would be even more complicated.

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