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Roman Jakobson, in his book "The Sound Shape of Language," supports the thesis of André Martinet that "the presence of the phoneme /h/ in languages makes particularly clear the fact that the valid feature is not voiced/voiceless but rather tense/lax (with a marked tenseness)."[1] In essence, Martinet is saying that if a language has the /h/ phoneme then the distinction between obstruent pairs will be relative tenseness and not voicing, such as with English /k/ and /g/:

"cot" [khat], "got" [gat].

Thus /k/ is aspirated in the initial position, aspiration being the contextual variant of the feature [±tense] in English stops. A non-aspirate /k/ occurs after /s/ in the word "scat" [skæt]; but in the word final position of "sack" [sæk], the unreleased /k/ is still more tense than the /g/ in "sag" [sæg]. The word initial aspiration of the stops is the marked, tense form, and also is a redundant feature of English speech.

Jakobson said that "Yiddish dialects subject to Slavic influence substituted the voiced/voiceless feature for the tense/lax one, and this change was paralleled by the loss of /h/."[2] The relationship between the presence of the glottal spirant and the tense/lax feature seems to be a strong linguistic force, or tendency. The speakers of languages that lack the /h/ phoneme often experience confusion when attempting to communicate in a language that has it. This is evidenced by the pronunciation of native Spanish-speakers learning English. In general, they have difficulty discriminating and producing the consonants of such minimal pairs as "bit" [bɪt]/ "pit" [phɪt], pronouncing the latter as [pit], with voiceless [p] instead of the aspirate English [ph], and probably with the tense vowel /i/ instead of the lax /ɪ/. French maintains its *h aspiré* in a latent form that appears orthographically as "h" but is "implemented as a glottal catch when preceded within a phrase by a word with a final consonant--e.g., *il hache* [il'aš]; for certain speakers such use is obligatory, for others it is optional."[3] The fact that French has a latent /h/ phoneme may be evidence that Latin (the parent of the Romance languages: Spanish, French, Italian, etc.) also had an /h/, a point that is somewhat debated. According to Robert Hall, the "Old Castilian /h-/ (lost in modern standard Spanish, but preserved in spelling and in some dialects)"[4] is ascribed to the influence of the substratum language of Basque, that had an /h/ but no /f/. The /f/ was replaced by /h/ from Latin to Spanish, e.g., *formica* > *hormiga* "ant".

Do the above phenomena occur arbitrarily? Or are they governed by specific linguistic laws of phonemic hierarchy? In the discussion of the hierarchical order that is evident in the way that children acquire consonants, Jakobson said:

> "The acquisition of back consonants presupposes in the linguistic development of the child the acquisition of front consonants, i.e., labials and dentals; and, in particular, the acquisition of back oral and nasal stops presupposes the acquisition of front oral and nasal consonants. Similarly, the acquisition of back fricatives presupposes

> the acquisition of front fricatives, and, on the other hand, that of back consonants. The existence of back consonants in the languages of the world presupposes accordingly the existence of front consonants. The solidarity is not reversible: the presence of front consonants in no way requires the presence of back consonants. In other words, no language has back consonants without containing front consonants. On the other hand, there are some languages with labials and dentals, but without back consonants, as, e.g., the language of Tahiti in which both velars--/k/ and /ŋ/--have changed to /ʔ/ and Kasimov-Tatar, in which all velars--both stops (voiceless and voiced, oral and nasal) and fricatives--were also replaced by the glottal stop."[5]

By applying the principle of irreversible solidarity, we see that the tense/lax consonant distinction can not be made by a child until he has integrated the /h/ in his phonology. The correlation between the acquisition of /h/ by English speaking children and their ability to produce tense (aspirate) consonants became evident when I heard my twenty month old nephew call me Dom [dam], instead of Tom [tham]. At that I proceeded to test him on his phonology. First, I tried to get him to say "hat" but he wouldn't cooperate. When his mother got him to to say it, he, in fact, did pronounce the /h/. Later, I made a paper hat and started to play with him. I repeatedly tried to get him to say "hat," but without success. About ten minutes after I gave up on him, he picked up the paper hat and brought it to me saying [æt...æt] as he waved it in front of me. Thus, when he started producing the word on his own, he was unable to pronounce the /h/, even though he had successfully mimicked it earlier. I tested him with several other words and achieved the same results--no /h/, and no tense/lax distinction among stops. A month later, I noted that he still hadn't acquired the /h/ when he pointed to the fire in the fireplace and said: [at] "hot"; and when I touched my hair and asked him what it was he replied: [er] "hair." Along with this, he was still unable to produce aspirate consonants.

> "It seems likely that children of all languages first produce predominantly unaspirated stops and aspirated variants not conditioned by the surrounding sounds, then gradually acquire the pattern of aspiration in the language they are learning."[6]

An apparent counter-example to the /h/ phoneme hypothesis is Yucatec-Mayan, which has an /h/ phoneme, but lacks aspirate consonants. (See table #1 in the Appendix). However, the tense/lax feature goes beyond aspiration to include a much larger set of possible variants.

> "While vowels are easily subject to a dilation of their energy into length, consonants find their marked opposites in the higher rate of energy discharged within a reduced interval of time vs. a lower rate of discharge within a longer interval. The marked term of this feature is obtained by the different varieties of extrapulmonic consonants. The merely contextual difference between two of these varieties--ejectives and implosives--has been confirmed by Greenberg on rich material....The consonantal abbreviation feature is, in relation to the vocalic prolongation feature, one of the striking examples of the mirror symmetry relating the consonantal and the vocalic subsystems to each other. Yet apparently the shortening of the

> checked consonants finds its counterpart in prolongation as a typical particularity of the tense consonants in their opposition to the unmarked, lax ones. The frequent co-occurrence of three corresponding consonants--tense, lax, and checked--speaks in favor of this interpretation.[7]

From this we may understand that the glottalized consonants of Yucatec-Mayan represent the tense, marked set, with a "higher rate of energy discharged" than their lax counterparts. Although voiced stops, also classed as lax, are present in the language, they were borrowed from Spanish, and are included in the paradigm within parentheses. Glottalization is characterized by the distinctive feature [±checked], and is represented by (') after the consonants in table #1.

> "As we have said, the analysis of the most varied languages reveals general synchronic laws of solidarity. According to these laws, a secondary value cannot exist in a linguistic system without the corresponding primary value. From this fact two consequences necessarily emerge for the evolution of any given linguistic system as well: without the primary value, the corresponding secondary value cannot arise in a linguistic system, and without the secondary value, the corresponding primary value cannot be eliminated. Thus, the laws of solidarity turn out to be panchronic. They retain their validity at every stage and in the course of every change of all the languages of the world."[8]

Would a language that had no /h/ but maintained a tense/lax feature among consonants be considered a counter-example to Jakobson's hypothesis? Mam, a Central American Indian dialect, is an example of such a language. (See table #2). With respect to irreversible solidarity, the tense/lax distinction does not presuppose an /h/ in the language, in other words, [±tense] can be the valid feature of a language without the /h/ phoneme. If you have a banana you have a fruit, but if you have a fruit, you don't necesarily have a banana, i.e., it is possible to have tense/lax without /h/; therefore, Mam is not a counter-example.

> "Every phonological system is a **stratified structure**, that is to say, is formed of superimposed layers. The hierarchy of these layers is practically universal and invariable. It occurs in the synchrony of language; consequently we have to do with a **panchronic ordering**. If there exists a relationship of irreversible solidarity between two phonological values, the secondary value can not exist without the primary and the primary cannot be eliminated without the secondary. This ordering is to be found in any **existing** phonological system, and it governs all its mutations; the same ordering determines...the acquisition of language."[9]

Igbo, a West-African language, is an example of a highly stratified system with various levels of phonemic marking distinctions. (See table #3). Some of the rarer phonological possibilities of language have been taken to the extreme, such as aspiration and nasalization. Igbo has both a tense/lax and a voice/voiceless distinction. According to Jakobson's hypothesis, it could not have such a variety of aspirate stops without first having the glottal fricative, just as it could not have nasalized fricatives without nasal consonants.

With respect to irreversible solidarity, Jakobson is in essence saying that no language has the /h/ phoneme without a concommitant tense/lax feature for consonants. Whether the distinction is made by aspiration, glottalization, or some other form of internal pressure and marking, if there is a distinction between higher and lower energy releases then the opposition in question is identified by the tense/lax feature.

All that has been discussed thus far upholds the position of Roman Jakobson; but now let us examine a contrary point of view.

Royal Skousen's criteria for an acceptable theory challenges the validity of the tense/lax feature. He said:

> "A theory is tested by its ability to predict the nature of linguistic behavior. Thus a theory is composed of two parts: (1) the rules of induction and (2) the empirical interpretation of descriptions. A theory without an empirical interpretation is not really a theory because it is not testable."[10]

In light of this definition, a conflict arises when classification terms are used as explanations of speech phenomena. There are some phonologists who would say that Jakobson was premature in postulating such an hypothesis, that a relationship between the presence of /h/ and the [±tense] feature in a language can not be empirically verified, and that such postulation is purely taxonomic. John Ohala said:

> "Discovery of sound patterns, though no simple task, is only the beginning of the phonologist's task: he must, as any scientist must, seek to explain the patterns he finds. There may be some who honestly don't want to explain things--they just want to classify sound patterns and engage in pure taxonomy. I can't say I know any card-carrying taxonomists, but if I were to meet one I would respect him and his philosophy even though I disagreed with it. But it is difficult to have respect for certain others who profess to be interested in explaining sound patterns but in fact are secret taxonomists. These phonologists, for example, may notice that one group of sounds do one thing whereas another group does the opposite. But rather than seek an explanation for this difference in behavior they simply tack on different labels to the two groups, X and not-X, and then "explain" the behavior of a given sound or the whole group of sounds as being due to the fact that they are "X" (or "not-X"). The label, "X", of course has to be an undefined term with no empirical content, e.g., strength, chromaticity, bleaching, sonority, or syllabicity (as it is applied to individual speech segments). The progress of a field is inhibited when labels are offered as explanations. It is far preferable to simply admit "things happen this way but I don't know why."[11]

Verification and empirical observation are necessary elements of a good theory; but these should not be allowed to hinder creative thought on the part of the theorist. Even if his idea is later proven false, he should be given credit for caring enough about the subject to try and describe it. Dreams and abstract notions have often led man to the truth, although some have led him to dead ends. The responsibility to test theories rests upon the researcher, who is possibly a theorist himself.

Wading through data will probably always be an integral part of this process. Derek Bickerton, in his book "Roots of Language," said:

> "Empirical knowledge is no guarantee of certitude, and its absence no barrier to insight....What is needed is not dogged fact-gathering (with or without moral sermons) but the capacity to distinguish between the trivial and the nontrivial. The task of the theorist is to tell the field worker where to look and what to look for, and if the latter chooses to reject such aid, he has about as much brain as the man who throws away his metal detector and proceeds to dig by hand the three-acre field where he thinks treasure lies buried."[12]

Jakobson is a linguistic metal-detector: he has located and pointed out many important theoretical concepts and ideas that deserve a closer look; in effect, he has told us where we might successfully dig to uncover some hidden truths about language. Nevertheless, with respect to his tense/lax feature, there remain some unanswered questions and doubts. Beside the fact that [±tense] is not an empirical feature, and only serves as a name to classify a phenomenon, the theory that the presence of /h/ in a language presupposes tenseness over voicing does not allow for the existence of all the logical possibilities.

Huntington's theorem states that "the number of elements in every logical field must be 2^m where m = 1,2,3..."[13] Therefore, although it would contradict Jakobson's hypothesis, there can exist by logic a fourth possibility--that of /h/ without [±tense]. The paradigm of 2^2 would appear as in Figure #1, with all the logical elements.

(Figure #1)

+/h/ (English) +tense	(?) +/h/ -tense
-/h/ (Mam) +tense	(Spanish) -/h/ -tense

From the Kutubuan language family of New Guinea, the two main languages Fasu and Foe, are aligned in phonemic comparison in Figure #2.

(Figure #2)[14]

Fasu	Foe	Fasu	Foe	Fasu	Foe	Fasu	Foe
p	-	t	t	k	k		
-	b	-	d	-	g		
f	f	s	s	-	x	h	h
	v						
m	m	n	n				
		r	r				

Both Foe and Fasu have the /h/ phoneme, yet "Foe has a series [of] aspirated stops /t,k/ contrasting with a series [of] unaspirated stops /b,d,g/; this contrast is missing in Fasu."[15] Fasu is clearly a candidate for the empty slot of the 2^2 paradigm--the counter-example to Jakobson's hypothesis. Is Fasu breaking the law of "Irreversible Solidarity"? It might be argued in Jakobson's favor that the fricatives /f,s/ are acting as relatively lax counterparts to the stops. Conceivably, a stop could be paired with a fricative. Spanish voiced stops, for example, are realized as fricatives intervocalically, but these particular contextual variants are not governed by /h/. It is then somewhat questionable that the stops and fricatives of Fasu are truly in opposition to one another. We may well ask: Is the /h/ phoneme so omnipotent that the theory is without contradiction? Although inconvenient, the truth to the question of Fasu can be tested by going to New Guinea to observe native speakers.

Some other possible counter-examples are Finnish and Hawaiian. The historical phonology of Finnish includes three unaspirated, voiceless stops (See Table #4). The existing voiced stops, /b,d,g/, came into the system through a borrowing from Swedish; and even these are realized as voiceless in the speech of many natives. The Finnish /h/ was part of the phonological inventory before any such loans occurred; this was a time when only one set of obstruents were present, without any oppositional pairs. Hawaiian also has the /h/ phoneme along with the voiceless stops /p,k/, but these have no tense counterparts. Vowel length is of greater significance, while the distinction and variety of consonants is minimal. The /h/ "occurs in virtually all present-day Polynesian languages."[16] Interestingly, a minority of these languages do have aspirate stops paired with unaspirated, voiceless complements--a definite example of tense/lax. Part of this small group with the [±tense] feature has the /h/ phoneme, while the other does not; thus following exactly the postulation of Jakobson, and his hierarchy of "Irreversible Solidarity." Nevertheless, they are the minority in the Polynesian family. The majority, Hawaiian being the most widely known, has the /h/ with no apparent category of tense versus lax--a direct contradiction to the hypothesis in question.

Undoubtedly, the /h/ phoneme plays some kind of role in the phonological hierarchy of language, and it seems unlikely that such relationships and hierarchies are coincidental, especially with regard to the acquisition order of phonology in children; however, Martinet's hypothesis as promoted by Jakobson does not

satisfactorily explain the phenomenon. To the question: is the tense/lax feature universally determined by the /h/ phoneme? The answer with the present data would be no. Jakobson has singled out an interesting, strong linguistic tendency; and through broader investigation, we may conclude that he was right; but the four logical possibilities of the /±h/, [±tense] paradigm represent algebraic truth that cannot be dismissed. The evidence favors the notion of the fourth category, and suggests that the phenomenon of tense/lax occurs independently of /h/. Further research needs to be done to arrive at a more stable and certain conclusion, but let this paper suffice to also point in a direction that deserves more than a passing glance.

APPENDIX

(Table #1) Yucatec-Mayan Phonology[17]

p	t	c	č	k	ʔ
p'	t'	c'	č'	k'	
b'					
(b)	(d)			(g)	
(f)		s	š		h
m	n				
w	l		y		
	r				
	(r̃)				

(Table #2) Phonology of Mam[18]

	lab.	dent.	alv.	alv-pal.	retro-flex	vel.	post-velar	glottal
plain stops	p	t		ky		k	q	ʔ
glottalized	p'*	t'*		ky'		k'	q'*	
plain affricates		ts		č	ç̣			
glottalized		ts'		č'	ç̣'			
fricatives			s	š	ş̣		x̣	
liquids		l	r					
nasals	m	n						
semi-vowels	w			y				

Spanish phonemic borrowings

stops (voiced)	b	d				g		

*These are imploded.

(Table #3) Igbo Phonology[19]

	Labial		Alveolar		Pal. Alv.	Pal.	Velar		Labio-Velar		Glottal
Plosive	p	b	t	d			k	g	kp	gb	
Aspirated Plosive	ph	bh	th	dh			kh	gh			
Palatalized Plosive	pj	bj									
Pal. Asp. Plosive	pjh	bjh									
Labialized Plosive							kw	gw			
Lab. Asp. Plosive							kwh	gwh			
Fricative	f	v	s	z				ɣ			h
Nasalized Fricative	f̃	ṽ	s̃	z̃							h̃
Palatalized Fric.											hj
Nas. Pal. Fricative											h̃j
Nas. Lab. Fricative											hw
Affricate					ʧ	ʤ					
Aspirated Affricate					ʧh	ʤh					
Nasal		m		n		ɲ		ŋ			
Labialized Nasal								ŋw			
roll				r							
Nasalized Roll				r̃							
Palatalized Roll				rj							
Lateral				l							
Semi-Vowel		w									

(Table #4) Finnish Phonology[20]

p	t	k	h	
	s			
m	n	ŋ		
	l			
	r			
v	j			

NOTES

[1]Roman Jakobson and Linda R. Waugh, *The Sound Shape of Language.* (Bloomington: Indiana Univ. Press, 1979), p. 151.

[2]Ibid. p. 151.

[3]Ibid. p. 151.

[4]Robert A. Hall Jr., *External History of the Romance Languages.* (New York: American Elsevier Publishing Co., Inc., 1974), p. 67.

[5]Roman Jakobson, *Child Language, Aphasia, and Phonological Universals.* Translated by A.R. Keiler. (The Hague: Mouton, 1968), p. 59.

[6]Charles A. Ferguson and Olga K. Garnica, "Theories of Phonological Development." *Foundations of Language Development: A Multidisciplinary Approach.* (New York: Academic Press, 1975), Vol. 1, p. 157.

[7]Jakobson and Waugh, (1979), p. 145-146.

[8]Jakobson, (1968), p. 53.

[9]Roman Jakobson, *Studies on Child Language and Aphasia.* (The Hague: Mouton, 1971), p. 12.

[10]Royal Skousen, "Empirical Interpretations of Psychological Reality," in *Proceedings of the Ninth International Congress of Phonetic Sciences*, ed. Eli Fischer-Jørgensen, Jørgen Rischel, and Nina Thorsen. (Copenhagen: Institute of Phonetics, University of Copenhagen, 1979), Vol. 2, p 125.

[11]John J. Ohala, "Phonetic Explanation in Phonology," in *Papers from the Parasession on Natural Phonology*, ed. Anthony Bruck, Robert A. Fox, and Michael W. LaGaly. (Chicago: Chicago Linguistic Society, 1974), p. 251-253.

[12]Derek Bickerton, *Roots of Language.* (Ann Arbor: Karoma Publishers, Inc., 1981), p. 45.

[13]Edward V. Huntington, "Sets of Independent Postulates for the Algebra of Logic." *Transactions of the American Mathematics Society.* (1904), Vol. 5, P. 309.

[14]Karl Franklin, Ed. "The Linguistic Situation in the Gulf District and Adjacent Areas, Papua New Guinea." *Pacific Linguistics.* (Canberra: The Australian National University, 1973), Series C - No. 26, Chapter 4, p. 155.

[15]Ibid. p. 155.

[16]Viktor Krupa, "The Polynesian languages: A guide." *Languages of Asia and Africa.* (London: Routledge & Kegan Paul Ltd, 1982), Vol. 4, p. 16.

[17]Robert W. Blair, *Yucatec Maya Noun and Verb Morpho-Syntax.* (Chicago: University of Chicago, 1964), p. 1.

[18]John Robertson, John P. Hawkins, and Andrés Maldonado, *Mam Basic Course.* (Provo, Utah: BYU Printing Services, 1969), p. ix.

[19]Elizabeth Dunstan and G.E. Igwe, "Two Views of the Phonology of the Ohuhu Dialect of Igbo." *The Journal of West African Languages.* (July 1966), Vol. 3, No. 2, P. 71.

[20]Fred Karlsson, *Suomen kielen äänne- ja muotorakenne.* (Porvoo: Werner Söderström, 1982), p. 66.

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