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Anthony Staiano and Feryal Yavaş  
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## Introduction

This third volume of the Kansas Working Papers in Linguistics covers a diversity of topics which range from general linguistic theory to child language. To provide coherency, we have, therefore, grouped the papers into a number of major sections as reflected in the Table of Contents. What follows is our attempt to capture the major point of each paper, organized according to those sections.

The first paper is Ken Miner's "On the Notion 'Restricted Linguistic Theory': Toward Error Free Data in Linguistics." Miner maintains that linguistic theories must be more firmly grounded on secure data bases. He contends that the attempt to construct theories based on limited data from a few languages leads to serious errors. Rather than seeking to construct general theories, Miner advocates that we should limit ourselves to "restricted theories" which may be confined to one language family.

The Phonetics-Phonology section contains four very different papers. Geoff Gathercole's research demonstrates that instrumental evidence can play a crucial role in phonological analysis. His instrumental research on strong and weak stops in Kansas Potawatomi clearly indicates that the underlying contrast between these series is preserved even in final positions, not neutralized as heretofore supposed. In addition, the paper provides evidence for the interaction between stress and the syntactic structure of Potawatomi.

Mehmet Yavas' paper on the implications of borrowing for Turkish phonology provides a modus operandi for the analysis of languages which have lexicons replete with loan words. In the case of Turkish, previous analyses, though recognizing the importance of loan words, have neglected to incorporate them into their descriptions. Drawing evidence from borrowing, Yavas proposes that current treatments of vowel and consonant harmony should be drastically revised: consonant harmony plays the pivotal role in determining the vowel choice, not conversely. By so analyzing Turkish, he is able to account for a wide range of data unaccounted for by treatments which assume the primacy of vowel harmony.

Robert Rankin's study of Quapaw as a dying language supports the evidence from child language acquisition, aphasia, and comparative linguistics that there exists a universal hierarchy of sound-type complexity. As Quapaw functioned less and less as a native language, principled changes occurred in its phonology: the types of series lost and the order in which they were lost were determined by their relative complexity, with the most marked being lost first.

Code-mixing is the topic of Maria Dobozy's paper. Taking a letter written by a bilingual American-Hungarian as her data, Dobozy describes the phonological rules that are operating in such a code-mixing, with special emphasis on vowel harmony. She demonstrates that vowel harmony is an important process in the system and plays a central role in the rendition of English words by such speakers.

The first paper in the Syntax-Semantics section is Gerald Denning's, "Meaning and Placement of Spanish Adjectives." Denning attempts to clarify the problems of the differences in the meaning and treatment

of restrictive adjectives in three dialects of Spanish. He argues that a strict generative semantic approach will not handle the data and suggests an analysis within the framework of pragmatics.

Virginia Gathercole provides a cross-linguistic study of the use of the deictic verbs "come" and "go." She formulates the uses of "come" and "go" in eleven languages by extending Talmy's (1975) model for verbs of motion to include a presuppositional component. Gathercole divides the contexts in which "come" and "go" are used into (a) immediate deixis and (b) extended deixis. Her goal is to characterize the use of deictic verbs of motion in the eleven languages studied by a limited number of assertional and presuppositional components and thus suggest a possible universal framework for such verbs.

Whereas Denning and Gathercole focus on language related issues, Juan Abugattas takes a more general, philosophical approach in his discussion of speech acts. He claims that previous speech act analyses used the sentence as the basic unit. Abugattas believes, however, that we must go beyond the sentence: "social reality" dictates that we categorize sets of sentences into speech acts, which he calls "complex acts."

Kurt Godden's paper, "Problems in Machine Translation Between Thai and English Using Montague Grammar," brings us to a specific language oriented concern: how to mechanically translate sentences, in particular those containing restrictive relative clauses, from one language to the other. He enumerates the problems related to such a task and proposes a solution involving meaning postulates and context within a Montague framework.

Historical and Comparative Linguistics is represented by Karen Booker's "On the Origin of Number Marking in Muskogean." Booker reconstructs two proto-Muskogean number markers, one dualizer and one pluralizer which were first used with intransitive verbs of location and then generalized to locative transitives. Later these markers spread to intransitive non-locatives. Booker maintains that the highly complex suppletive verb system of Muskogean arose when these markers lost their original meaning.

Three papers, Esther (Etti) Dromi's analysis of the acquisition of locative prepositions by Hebrew children, Gregory Simpson's study of children's categorization processes, and John More's review of relative clause research, constitute the Child Language Acquisition section of the working papers. Dromi's study, which is one of the few published works in the acquisition of Hebrew, compares the order of acquisition of Hebrew locatives with Brown's (1973) order for English and also with Slobin's (1973) universals. Among her findings, Hebrew al ("on") is acquired later than English on. Her findings for Hebrew locatives are particularly interesting in that they allow a comparison of the acquisition of prefixes with that of full prepositions. Her conclusions point to the pivotal role that morphological complexity plays in the order of acquisition of locatives in Hebrew.

Gregory Simpson's major concern has to do with the process by which children form conceptual categories. He argues, on the basis of experimental data, that overextensions should not be taken as evidence

for category formation. His data suggest a distinction between concept formation and object naming, a distinction not made in previous studies. "Function," what objects can do or what can be done to them, determines how that object is conceptualized, but an object's perceptual properties may determine the name given to it. Therefore, "the child may know that two objects don't really belong together, but gives them the same name until he has more evidence."

The acquisition of relative clauses has been a topic of great interest among psycholinguists. John More presents a valuable critical review of the recent literature with special emphasis on the debate between Dan Slobin (1971), Amy Sheldon (1974), Michael Smith (1975), Tavakolian (1977), and deVilliers et al. (1976). The Minimal Distance Principle, the Noun-Verb-Noun Strategy, the Parallel Function Hypothesis, and Slobin's operating principles are compared, along with the formulations of deVilliers and Tavakolian.

Five major topic areas are represented in this third volume of the Kansas Working Papers in Linguistics. Each paper in its own way is a contribution to linguistic scholarship: some provide evidence in new areas of inquiry, others bring new evidence to bear on old questions, while still others suggest future courses of research.

Anthony Staiano and Feryal Yavas

Editors

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INSTRUMENTAL PHONETIC STUDIES AND LINGUISTIC ANALYSIS : The case of Kansas Potawatomi

Geoff Gathercole

Introduction

Phonological studies are usually based on impressionistic and psychologically validated approaches. Thus an abstract phonological system is constructed on the basis of auditory judgements of phonetic quality by the investigator and judgements of sameness or difference by the speaker-informant. Diametrically opposed to this procedure is one that begins with objective data and attempts to construct a phonology with no prior assumptions about the nature of the resulting system. One of the very few instrumental studies in Algonquian linguistics follows this latter approach. Hickerson (1958a, 1958b, 1959a, 1959b) has done a thorough instrumental study of Shawnee beginning with no assumption about the phonemicization of the language. She contrasts her approach to that of linguists who

find it more practical to proceed from posited functional or abstract units, or at least an assumption that these exist, to specification of their variants.

(Hickerson 1958a, p.20)

Hockett (1955) argues that for linguistic purposes the stream of speech is not segmentable on an instrumental level.

Thus while it is not logically valid to say that the acoustician must accept the findings of the phonologist as a stable frame of reference, it is an empiric fact that doing so constitutes a practical short-cut that the acoustician would be foolish to reject. (Hockett 1955 p.191)

*He describes the role of instrumental studies as that of providing a description of the acoustic correlates of phonological elements and of clarifying points of difficulty in phonological analyses.<sup>1</sup>*

For this paper, we adopt the latter position; namely that an abstract system is set up on the basis of linguistically significant contrasts and that instrumental studies can be used to properly classify the units and rearrange the system to reflect the objective articulatory and acoustic facts. This paper falls into two parts. In the first, we present some data on the acoustic correlates of the segmental features weak and strong in Potawatomi vowels and obstruents. In the second part, we investigate the heretofore unstudied prosodic system of Potawatomi.

The data used for this study are drawn from tapes of Kansas Potawatomi collected by Ken Miner, myself, Sonia Manuel and William Wight for the purpose of compiling a lexicon of Potawatomi, and does not therefore suffer from the problem of articulatory over-exaggeration that Hockett calls spoon-feeding (Hockett 1955 p.191). However, the data are far from being naturalistic, having been elicited in units of at maximum a two-predicate sentence<sup>2</sup>.

### Potawatomi Sound System

As a point of departure for this section, we adopt the only phonemic analysis of Potawatomi available in the literature, that found in Hockett 1939 (p.1).

The table of phonemes is as follows:

#### Consonants:

Short stops <sup>3</sup>	p	t	ʔ	k	ʔ
Long stops	p·	t·	ʔ·	k·	
Short spirants		s	ʃ		
Long spirants		s·	ʃ·		
Nasals	m	n			
Semivowels	w		y		

#### Vowels:

i		o
	ə	
ε		a

### The Segmental Features Weak/Strong

The vowels of Potawatomi have been divided into weak and strong corresponding to Proto-Algonquian short and long vowels respectively<sup>4</sup>. Our measurements confirm that length is a significant correlate of strength in the vowels. As Table 1 shows, the weak vowel /ə/ is on average slightly less than half as long in duration as the strong vowels /i/, /ε/, /a/ and /o/.

A stressed weak vowel may be lengthened to as much as 100 milliseconds. This is especially frequent in monosyllables like /m·ək/ 'wood', /m·ək·/ 'box', /m·ək·/ 'beaver'.



Table 1

	Number of Tokens	Mean Duration in Msecs.	Standard Deviation
Weak Vowel /ə/	22	65	16.9
Strong Vowels /i/ /ε/ /a/ and /o/	45	140	41.1

Comparison of the Mean Duration in Milliseconds of Potawatomi Weak and Strong vowels.

The obstruents (stops and fricatives) have similarly been divided into weak and strong series. Following Hockett's description of the distribution of the allophones of the strong and weak stops, it should be possible to clearly distinguish strong stops from their weak counterparts i) between vowels, ii) after nasal consonants, and iii) before high glides. In initial and final position, the contrast is neutralized<sup>5</sup>, with only the voiceless allophone of the weak stop occurring. In the latter two of these environments, namely following a nasal consonant and preceding high glides, the weak stops are voiced. However, in these and in the non-voicing environments, the strong stops have been claimed to be longer than the weak ones. Measurements of the total duration time<sup>6</sup> of 36 tokens of strong and weak stops in various environments are given in Table 2. These confirm that length is a significant articulatory correlate of strength in Potawatomi stops.

Table 2

	Intervocalic	Preceding High Glide	Following Nasal Stop	Following Non- Nasal Consonant
Strong Stops	212.0	262.5	139.5	none in sample
Weak Stops	92.25	100.5	36.0	150.0

Average Total Duration Time in Milliseconds of Potawatomi Strong and Weak Stops Analysed by Environments.

In the intervocalic environment, average duration of the weak stops is less than half that of the strong stops. Considerable shortening of

both strong and weak stops occurs following a nasal consonant. In this environment, the strong stop falls almost into the range of weak stop duration. However, since weak stops are fully voiced in this environment, the perceptual need for the length cue is diminished. Comparison of the relative lengths of the vowels which precede some of these stops shows there is no systematic shortening or lengthening in the vowel which would contribute to perception of strength or weakness in the following stop. In addition, only in the case where a weak stop follows another weak stop is there any significant increase in the time which elapses between the release of the stop and the onset of the following segment. In this case, the duration of the consonant includes the aspirated release of the preceding consonant and seems to be roughly equivalent to the duration of a weak vowel added to the duration of the weak stop itself.

Having seen that duration of stop closure is a systematic and significant acoustic cue distinguishing strong and weak stops in environments where these are known to contrast, we turn to the remaining environments. Hockett states that strong stops do not occur in utterance initial and utterance final position. This assignment of all initial and final stops to the weak series is not totally confirmed by our findings. A small number of cases where an underlying strong stop falls in utterance final position were found and measured. The average duration of final underlying strong and weak stops compared to the average duration of strong and weak stops in all other environments is shown in Table 3.

Table 3

	In Utterance Final Position	In All Non-final Envir- onments (see Table 2)
Weak Stops	107.0	98.0
Strong Stops	172.5	205.0

Average Duration in Milliseconds of 45 Tokens of Potawatomi Weak and Strong Stops Comparing Those in Final Position with Those in All Other Environments.

The data on weak stops are predictable enough. The figures for final stop duration are fully compatible with those for other environments. However, in the data for underlying final strong stops, we find that the underlying strength is reflected in the surface phonetic form, contrary to previous predictions. There does seem to be a degree of weakening (as there is some degree of strengthening for the final weak stops), and this may contribute to the difficult perceptual differentiation. However, insofar as these figures are representative, weakening

has to be interpreted as an allophonic feature of strong stops. This conclusion should be regarded as tentative because of the small number of tokens of final strong stops in these data and because of the unavailability of more speakers to confirm this as a fact of the language in general.

Finally, we turn to the other class of obstruents, the fricatives. These are also divided into weak and strong series, and no limitation on their distribution is found by Hockett. The strong fricatives /s·/ and /š·/ are "strongly articulated, voiceless and long". The weak fricatives /s/ and /š/ have voiced and voiceless lenis allophones. Table 4 shows the average durations for 23 tokens of strong and weak fricatives.

Table 4

	Word Internal Not Following Nasal	Following Nasal Stop	Word Final
Weak Spirant	111.0	60.0	243.75
Strong Spirant	225.0	none in sample	195.0

Average Duration in Milliseconds of 23 Tokens of Potawatomi Weak and Strong Spirants Analysed by Environments.

Again the evidence clearly shows that length is an important feature distinguishing strong and weak fricatives, the strong fricatives averaging twice as long as the weak ones. The dramatic shortening of the spirant following a nasal consonant mirrors that found in the data on the stops. The reversal found in the last column is probably an accident of the sample (only one token was measured in this position).

In summary, in this section we have presented spectrographic evidence that confirms previous perceptual judgements that length is a significant and distinctive feature in Potawatomi phonology for both vowels and obstruents. We have uncovered a suggestion that the neutralization of strong and weak stops does not occur in final position. We have been unable to obtain instrumental data on initial stops. Electromyography and measurements of sub-glottal pressure may give evidence for a surface distinction of initial strong and weak stops, too.

#### Potawatomi Stress and Intonation

Studies of prosodic features in Algonquian linguistics are few and far between. Davis (1962) has shown that pitch is contrastive in Cheyenne, and Frantz (1972) has shown, by reference to Pike and Scott (1963),

that Cheyenne pitch accent behaves like stress in multiple-stress languages inasmuch as Cheyenne has three levels of pitch and two moving pitch contours (i.e. downglide and upglide). Hickerson (1959b) provides measurements of pitch from Shawnee data but, following her bias, fails to correlate the readings with perceptions of stress, and as a consequence fails to develop a description of prosody in Shawnee. She does state that there is no clear correlate for stress in Shawnee.

Voorhis (1974) describes Kickapoo as having a system of accentuation involving contrasts of pitch which is not phonemic but predictable at the phrase and sentence level. While we could not prejudge the issue, it is no surprise to find that the Potawatomi accentual system is rather like the Kickapoo.

#### Acoustic Correlates of Accent in Potawatomi

A pronounced accentuation is perceived on certain syllables in the data studied. A perceived stress can be associated with a combination of some or all of the following factors: increased intensity, higher pitch and increased duration. Lehiste (1970) discusses stress at length and concludes that

in many languages, fundamental frequency combined with intensity provides the decisive cue; in others, duration is the most dependable correlate of stressedness (p.138).

Measurements of pitch and duration can be made with a high degree of reliability from the recordings available. A rough picture of the function of amplitude can also be gleaned but reliable measurements of intensity depend on carefully controlled recording conditions.

Tables 5a and 5b show the fundamental frequency in cycles per second as a measure of pitch, the duration in milliseconds, and the relative amplitude of fifty-seven syllabic segments of Potawatomi.

Table 5a

		Fundamental Frequency (cps)	Duration (Msecs.)	Amplitude (high, medium & low)
Perceived as Stressed	Strong Vowel	236	115	70% high 30% medium
	Weak Vowel	228	74	75% high 25% medium
Perceived as Unstressed	Strong Vowel	179	129	16% high 39% medium 45% low
	Weak Vowel	153	63	9% high 27% medium 64% low

Comparison of Average Fundamental Frequencies, Average Durations and Relative Amplitudes for Stressed and Unstressed Strong and Weak Potawatomi Vowels. Female Speaker.

Table 5b

		Fundamental Frequency (cps)	Duration (Msecs.)	Amplitude (high, medium & low)
Perceived as Stressed	Strong Vowel	141	144	100% high
	Weak Vowel	125	75	100% high
Perceived as Unstressed	Strong Vowel	113.5	133.5	50% high 25% medium 25% low
	Weak Vowel	none in sample		

Comparison of Average Fundamental Frequencies, Average Durations and Relative Amplitudes for Stressed and Unstressed Strong and Weak Potawatomi Vowels. Male Speaker.

It is apparent that while there is some degree of correlation between high intensity and stress, this is not as reliable a correlate of perceived stress as high pitch. High levels of intensity not associated with rises in pitch mostly correspond to the presence of glides and sibilants, but these are not perceived as points of accentuation. Many rises in pitch on final syllables, not associated with increases in amplitude, are found in the speech of the male informant. These correspond to an intonation pattern to be discussed later. Length is clearly an independent variable. Pitch, as measured by fundamental frequency is the most significant correlate of stress.

#### Function of Accent in Potawatomi

Accent in Potawatomi is not phonemic. It is a phenomenon that occurs on the phrase level as is apparent from the following examples.

ʔo wtápyan	'the wagon'
ni wtápyanən	'the (obviative) wagon'
pánočɛ	'boy'
pənóčɛyən	'boys'
táti	'he gambles'
ntát·ati	'I gamble'
ʔɛ-wi-mikčéwinət	'that he (obviative) might work'
ʔɛ-wi-míkčéwit	'that he might work'

In each of these pairs, the accent is seen to move to occupy the position of the third syllable from the end of the phrase, or the first syllable of a disyllabic phrase. The term phrase will be defined for now somewhat circularly as one of those units of utterance which carries an accent group, though later it will be seen that phrases in this sense are definable in syntactic terms.

Hockett (1939 p.1) has distinguished sentence-final and non-sentence-final phrase-final intonation.

Both are characterized by pauses and lowering of pitch but these are more marked for sentence-final than for non-sentence-final phrase-final.

Elsewhere, he refers to these as period intonation and comma intonation, respectively, the latter presumably because of the apparent similarity it holds to the conjoined or embedded sentence intonation in English.

It is convenient at this point to set up intonation contours in terms of three levels of pitch and to identify the accent as the third level (the highest pitch) in such a pattern. The most regular intonation pattern in Potawatomi is of the form

(1) (2) 3 1

where each pitch level has the following distribution in terms of syllables in the phrase.

- |                  |   |
|------------------|---|
| 1 = low pitch    | <ul style="list-style-type: none"> <li>i) The first vowel of a phrase especially when more than one more vowel occurs before the accented vowel.</li> <li>ii) Vowels following the accented vowel (except as below).</li> </ul> |
| 2 = middle pitch | Strong vowels (when not accented) and weak vowels between first strong vowel and phrase accent.   |
| 3 = high pitch   | Accented syllables; regularly the third syllable from the end of the phrase, or the first vowel in a phrase of fewer than four syllables. Accent may fall on weak or non-weak vowels.   |

Representative examples are:-

2 3 1 1  
ki-mnopmatse

'he got well'

2 2 3 1 1	win kɛ ki-mmatmot	'that he was praying, too'
1 1 2 2 3 1 1	ki-təkčɛʔan ʔi pənyən	'he stuck the potato (with a fork)'
3 1 1	ntəpəntan	'I own it'
3 1 1	təkčɛkən	'fork'
2 3 1 1	təkčɛkənən	'forks'

This intonation/accent pattern is characteristic of any class of utterance (including questions and negations) from a single word up to a simple sentence and even a complex sentence. It is relatively rare, however, in commands. For imperative/prohibitive sentences, and also some other constructions with analogous meanings, there is a slightly different pattern, characterized essentially by a rising pitch on the last syllable. These commands (Hockett classifies them as exclamations and uses the exclamation point (!) to denote their special intonation) regularly retain the same accentuation pattern as the non-imperative but differ in that the final syllable is produced on a rising pitch that may rise to a level as high as the accent pitch. Sometimes this pattern of final rising pitch is found to replace the antepenultimate syllable accent, especially in the case of commands of fewer than four syllables.

Examples of the above are:-

1 1 1 2 3 1 1	win nə ʔo ki-wnəšk-waʔan	'Did she interrupt him?'
2 2 2 2 3 1 1	čə wi ʔo ki-wik-mas-in	'He didn't invite them'
2 3 1 2	kin wə-naptə	'Choose it!'
3 1	kin maškonən	'You hold it!'
1 3 1 2	kin wantəwapəm	'You look for him!'
1 3 1 3 1	kə-təkčɛwak ki pənyək	'You can stick the potatoes!'

2 3 1  
ktəwɪk·məko 'You're invited!'

wɪk·əm 'Invite him!'

1 2  
wə-mpan 'Go to sleep!'

In addition to these two patterns, there is a third pattern which, as mentioned above, Hockett calls comma intonation. This seems to be more marked than he has claimed. It is characterized by a level middle pitch on the last syllable of a non-sentence-final phrase, instead of the expected low pitch.

2 3 1 2 2 2 3 1 1 'He hired him that he might  
ki-nok·anan ʔɛ-wi-mikčɛwinət work.'

We can reasonably question whether we would expect to find full phrase intonation on an embedded or conjoined phrase. Above we mentioned that a phrase (i.e., a unit to which the intonation pattern applies) can be as short as a single word or as long as a complex sentence. Ignoring the fact that any word can be a complete utterance in the correct context, let us examine what Hockett describes as 'full clauses' (p.120ff.).

These consist of a verb at minimum and in addition any of the following: subject and object nouns (including participials), locatives, demonstratives, and emphatic pronouns. Since the verb is obligatorily marked for the subject, object and mood, and optionally marked for various forms of aspect including time, by a series of affixes, these are always included in the phrase. Hockett refers to such subjects and objects as implicit, and he describes how they can be made explicit by the use of a nominal. He then analyses the use of the first person and second person emphatic pronouns as in extraposition, henceforth apposition, to the internal subjects and objects. It would seem to be more useful to treat these pronouns along with the third person nominals and demonstratives in a unified way, especially when phrase intonation for these constructions behaves identically. In my view it is most useful to say that the verb form with its affixes can stand as a complete sentence, and that overt nominals of the kinds mentioned may be either 'included' or placed in apposition. This claim derives from two facts: i) the notion of apposition is needed to account for repetitiousness outside of the verb form (i.e., when an included demonstrative stands in apposition to an overt noun, or vice versa), and ii) near minimal intonation pairs exist where the phrase pattern runs over the whole sentence in the 'included' case or the pattern is repeated in the case where the nominal stands in apposition. A nominal in apposition will carry full phrase intonation independent of the main predication, which in turn will carry a full phrase intonation pattern. In the case of monosyllables (e.g., win,



nin, ʔo, etc.), we find a long falling tone. On the other hand, an included nominal will become subject to the intonation contour of the phrase and may well take the main accent away from the verb.

Examples of each of these patterns follow:

#### Minimal Sentence

1 2 3 1 1  
wtəsik·wentəso

'He's washing himself'

2 1 1  
nki-pəksok

'He shot me'

#### Sentence with included nominal

1 2 2 2 2 3 1 1  
ki-kiʃpnənan ni wtəpyanən

'He bought the wagon'

1 2 2 2 3 1 1  
wtəmoʃknəton ʔi motəy

'She's filling the bottle'

#### Sentence with nominal in apposition

3 1 1 2 3 1 1  
wtəʃəman niw mpipiyən

'She's feeding the baby'

2 1 1 1 3 1 1  
ki-tawə ni wtəpyanən

'He sold the wagon'

1 3 1 1 2 3 1 1  
kətiʃəynon niw mənʔəkənən

'There are only a few books'

#### Near minimal pair of above types

2 2 2 3 1 1 1  
kin ktəpmənma ʔo pənoʃə

'You can look after the baby'

3 1 1 1 3 1 1  
win wənyəwan niw pənoʃəyən

'She has the baby'

#### Irregularities

The above picture of the intonation patterns fails to take into account the many irregularities that remain. It does describe the mass of the data studied. Some of the irregularities fall into the following three categories.

#### Paradigm Forms

There is strong circumstantial evidence that forms elicited one

after another have produced distortions, e.g.

2 3 1 1  
ki-kišpənən            'He bought it'

3 1 1 1  
nki-kišpənəna        'I bought it'

An especially strong indication that this is a paradigm effect is that a further repetition of a 'distorted' form will often fall into what I claim is the regular pattern. In addition, in many instances nouns given in isolation attract a rising tone to a plural or locative ending. This appears to be a citation phenomenon since it is not found consistently in the full sentence data.

#### Differences Between the Informants Studied

The rules given most satisfactorily describe the speech of Martha Lewis, the female informant. Jack Forty's speech is fairly compatible with this description but two systematic differences are a) he has a tendency to use a moving tone within syllables, rather than between them, which gives a very musical tone to his speech, and b) he has a tendency to finish utterances on a rising contour rather like an inquiring tone in English.

#### Genuine Irregularities in the Language

These include idiomatic forms, and fossilized forms resulting from disuse of the language.

#### Conclusion

The notion that instrumental studies are of little interest to the linguist is challenged. Spectrographic study of a corpus of data from Kansas Potawatomi suggests that an earlier phonemicization erred in describing strong stops as limited in distribution, while at the same time confirming the importance of duration as the physical correlate of strength for vowels and obstruents. Further analysis on the suprasegmental level reveals that Potawatomi has a non-phonemic accent system which is based on the differentiation of pitch levels. The phrase level pitch patterns (intonation contours) are found to interplay with the syntactic patterns in an interesting way, reflecting the optionality in Potawatomi of nominals, demonstratives and emphatics.

### Footnotes

1 For a thorough discussion of the use of spectrographic studies in phonological analysis, see Hockett 1955 pp. 180-211.

2 Unfortunately, Hockett's ultimate requirements ('Eventually it is imperative that naturally flowing speech - which means rapid, carelessly articulated speech - be examined.') are out of reach these days, since we are dealing here with a language that in nearly all cases has been replaced by English as the first language.

3 The affricates /č/ and /č̣/ are included with the stops. This follows Hockett's practice and derives from the fact that they behave distributionally like the stops. No evidence is found here to challenge that analysis.

4 Hockett uses the terms short and long in the phonology and weak/strong in the discussion of morphophonemics.

5 Hockett, of course, does not use this terminology. He remarks that "The limited distribution of the long stops might lead one to characterize them as defective."

6 Hickerson's definition (1958b p.131): 'The time between the terminus of one vowel and the onset of the next.' We extend this definition to refer to nasals and glides as well as vowels. In the case of fricatives and final stops, we have measured the duration up to the release.

7 The duration of stops in final position is the time between the end of the preceding vowel and the release of the stop.

8 The term extraposition is confusing here because of the current usage. For this reason, I choose to use the term 'apposition' which I believe accurately reflects the value of this phenomenon.

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