A CONTRASTIVE PHONOLOGY OF TAMIL, TELUGU, KANNADA AND MALAYALAM BASED ON DISTINCTIVE FEATURES

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Introduction

Speech pathology deals with the understanding, assessment, and treatment of speech and language disorders. This necessitates a good understanding of the case who is to be treated, the problem the case has and in addition, the language to be taught. The situation in India, with its multiplicity of linguistic groups, presents itself additional problems in that the speech clinician may have to work with languages non-native to him. Even if the therapist is a native speaker of the language with which he has to work, it is important for the speech clinician to have a clear understanding of his own speech   Recently there has been great emphasis on distinctive feature analysis of speech. Attempts are now being made to programme articulation therapy based on distinctive features.

The present study attempts to present a contrastive phonology of four main South Indian languages, Tamil (Ta), Telugu (Te), Kannada (Ka), and Malayalam (Ma) which are the four main languages belonging to the Dravidian family of languages.

The study is written with the object of helping the students of speech pathology —

   i.   to evaluate the speech of the case as weii as that of the therapist, objectively,

   ii.   to help the therapist to work with cases whose language is any one of the four languages Ta, Te, Ka, and Ma for whom any of these languages may be a foreign tongue, and

   Hi.   to assist the therapist in programming of articulation therapy.

A brief sketch of the phonology of the segmental features of Ta, Te, Ka, and Ma is given, with no specific consideration to higher level analysis of these languages. The phonological outlines are based on the analyses of standard educated dialects of Ta, Te, Ka, and Ma, spoken in Madras, Hyderabad, Mysore and Quilon, respectively.

1.0- *Distinctive Feature Analysis*

1.1. *Distinctive feature matrix*

   Table 1 is the distinctive feature matrix. Eleven distinctive features are necessary to distinguish the phonemes of the four languages. These are vocalic (I) consonantal (II) nasal (III) continuous (IV) tense (V) grave (VI) compact (VII) flat (VIII) sharp (IX) diffuse (X) and strident (XI). Distinctive features I, II, HI, IV, V, VI, VII, VIII and X are significant in all languages, whereas XI is significant in Ta and

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Table 1

Phonemes

Distinctive Features		Language	i	u	e	o	a	v	y	m	n	ŋ	ñ	ṇ	p	b	t	d	ṭ	ḍ	c	j	k	g	s	ṣ	ś	h	l	ḷ	ḷ	R	r
		Ma	i	u	e	o	a	v	y	m	n	ŋ	ñ	ṇ	p	b	t	d	ṭ	ḍ	c	j	k	g	s	ṣ	ś	h	l	ḷ	ḷ	R	r
		Ta	i	u	e	o	a	v	y	m	n		ñ	ṇ	p	b	t	d	ṭ	ḍ	c	j	k	g	s	ṣ	ś		l	ḷ	ḷ	R	r
		Te	i	u	e	o	a	v	y	m	n			ṇ	p	b	t	d	ṭ	ḍ	c	j	k	g	s	ṣ	ś		l	ḷ		R	
		Ka	i	u	e	o	a	v	y	m	n		ñ	ṇ	p	b	t	d	ṭ	ḍ	c	j	k	g	s	ṣ	ś	h	l	ḷ	ḷ	R	
	I	Vocalic	+	+	+	+	+	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	+	+	+	+	+
	II	Consonantal	−	−	−	−	−	+	−	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	−	+	+	+	+	+
	III	Nasal								+	+	+	+	+	−	−	−	−	−	−	−	−	−	−	−	−	−		−	−	−	−	−
	IV	Continuous	−	+	+	−	−	+	+	−	−	−	−	−	−	−	−	−	−	−	−	−	−	−	+	+	+	+	+	+	+	−	−
	V	Tense	−	−	−	−	−							+	−	+	−	+	−	+	−	+	−	+	+	+	+						
	VI	Grave	−	+	−	+	+	+	−	+	−	+	−	−	+	+	−	−	−	−	−	−	+	+	−	−	−	−	−	−	−	+	+
	VII	Compact	−	−	+	+	+	−	−	−	−	+	+	+	−	−	−	−	−	−	+	+	+	+	−	+	+	+	−	−	−	+	+
	VIII	Flat																						+	+		+	+		+	+	+	−
	IX	Sharp								−	+		+		+		+		+		+		+		+		+						
	X	Diffuse	+	+	−	−	−																										
	XI	Strident																															−	+

Ma and IX is significant in Ma only. A plus sign indicates the presence of the feature and minus sign its absence.

The distinctive features can be described on the basis of articulatory movements of the organs of speech and also on the basis of spectrographic analysis of the acoustic wave patterns of the sounds. Based on spectrographic analysis of sounds the distinctive features have been described as follows :

Vocalic: Phonemes having a single periodic source whose onset is not abrupt. This feature separates all the vowels, laterals, trill and flap from all other sounds.

Consonantal: Consonantal phonemes are characterized by the presence of zeros that affect the entire" spectrum. All consonants except the semivowels are consonantal.

Nasal: Nasal phonemes show a higher formant density than that of the homorganic oral phonemes. This feature separates all nasals from the other consonants.

Continuous: A non abrupt onset is the characteristic of the continuous phonemes. This feature separates the fricatives from stops and laterals from trill and flap sounds.

Tense: Tense phonemes have a longer sound interval and greater energy concentration. The voiceless stops are tense and also velar fricative.

Grave : Grave phonemes show a lower side predominance of the spectrum. This feature separates the labial and velar consonants from the other consonants and back vowels from front vjowels.

Compact: Compact phonemes have a relative predominance of one centrally located formant region. Palatal, and velar stops, nasals and fricatives and low vowel are compact.

Flat: Flat phonemes exhibit a downward shift of a set of formants of the spectrum. All retroflex consonants exhibit this feature.

Sharp: Sharp phonemes show a slight rise of the second formant and to some extent also of the higher formants.

Diffuse : Diffuse phonemes have predominance of one or more non-central formants or formant regions. The high vowels are separated from the mid vowels on the basis of the diffuse feature.

Strident: Strident phpneme shows irregular wave form. A random distribution of black are as on the spectrograms are found in the case of strident phonemes. A medio-lateral retroflex continuant is separated from the lateral retroflex continuant on the basis of this feature.

Table 2 gives the number ofsounds having the distinctive features in the respective languages.

Table 2

Distinctive feature	Number of Sounds Havipg the leature			
	Tamil	Telugu	Kannada	Malayalam
Vocalic	10	8	8	10
Consonantal	23	20	20	26
Nasal	5	3	4	6
Continuous	6	6	5	7
Tense	8	8	7	9
Grave	8	7	8	9
Compact	10	9	10	10
Flat	7	6	5	7
Sharp	2	2	2	2
Diffuse	0	0	0	2
Strident	1	0	0	1

1.2   *Blanching diagram*

Diagram 1 is the branching diagram. The branching diagram has nodes and binary distinctions, known as branches. The node indicates the distinctive feature and branches to the right and left indicate the presence vs. absence of the distinctive feature referred in the node.

Diagram 1

Branching diagram

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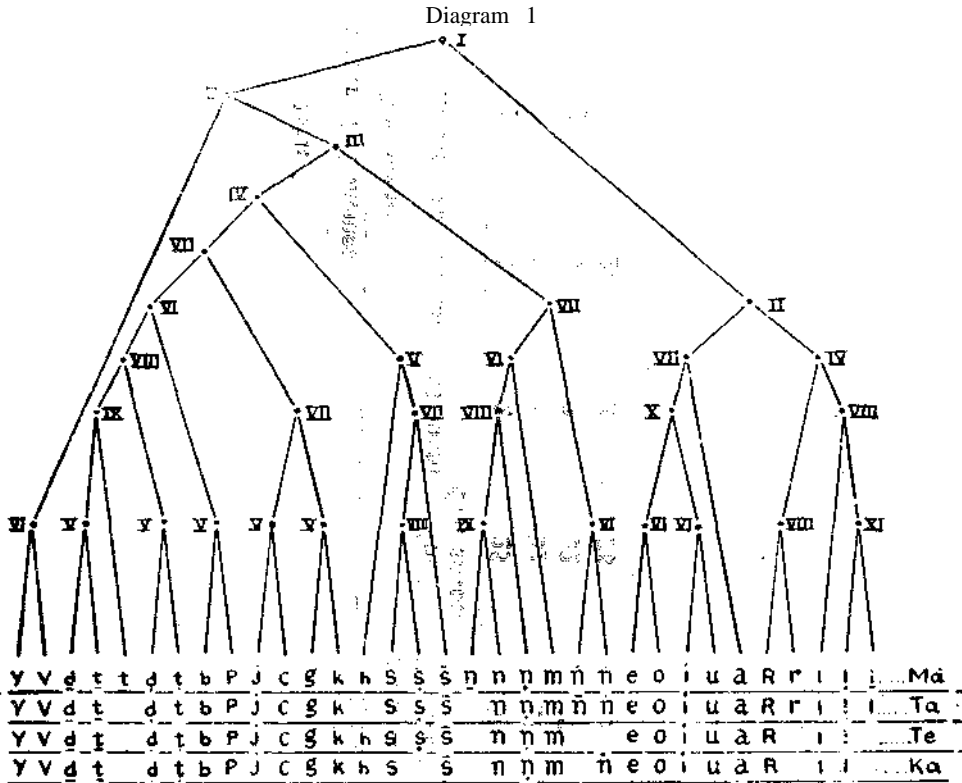
2.0. *Phonological outline*

Table 3 gives **the** number of phonemes in Ta, Te, Ka and Ma.

Language	Number of Phonemes								Total Number of Phonemes
	Vowels	Consonants							
		Stops	Nasals	Fricatives	Laterals	Trill & Flap	Continuants	Total Consonants	
Ta	5	10	5	3	3	2	2	25	30
Te	5	10	3	4	2	1	2	22	27
Ka	5	10	4	3	2	1	2	22	27
Ma	5	11	6	4	3	2	2	28	33

2.1. *Vowels*

Table 4 gives the vowel phonemes with their respective positions.

Table 4

	Tamil			Telugu			Kannada			Malayalam		
	Front Spread	Central Neutral	Back Round	Front Spread	Central Neutral	Back Round	Front Spread	Central Neutral	Back Round	Front Spread	Central Neutral	Back Round
High	i		u	i		u	i		u	i		u
Mid	e		o	e		o	e		o	e		o
Low		a			a			a			a	

2.2. *Consonants*

Table 5 gives the consonant phonemes with their approximate point and manner of articulations.

Table 5

Manner of Articulation	Labial Voiceless	Labial Voiced	Dental Voiceless	Dental Voiced	Alveolar Voiceless	Alveolar Voiced	Retroflex Voiceless	Retroflex Voiced	Palatal Voiceless	Palatal Voiced	Velar Voiceless	Velar Voiced	Language
Stops	P	b	t	d			t	d	c	j	k	g	Ta [1]
	P	b	t	d			t	d	c	j	k	g	Te
	P	b	t	d			t	d	c	j	k	g	Ka
	P	b	t	d	t		t	d	c	j	k	g	Ma
Nasals		m				n		n		n		n	Ta
		m				n		n				n	Te
		m				n		n				n	Ka
		m		n		n		n		n		n	Ma
Fricatives					s		s		s				Ta
					s		s		s		h		Te
					s		s		s		h		Ka
					s		s		s		h		Ma
Laterals						l		ll					Ta
						l		l					Te
						!		l					Ka
						l		ll					Ma
Trill & Flap						r		R					Ta
								R					Te
								R					Ka
						r		R					Ma
Frictionless Continuants		v								y			Ta
		v								y			Ta
		v								y			Ka
		v								y			Ma

2.3.0. *Distribution*

2.3.1. *Vowels }i e ao u*

All vowels occur initially medially and finally in Ta, Te, Ka, and Ma except /o/ in Te in final position. (Long vowels are treated as a sequence of two short vowels. In all languages there is contrast between long and short vowels in initial, medial, and final position except for /o/ in the final position.)

/i/High front spread vowel

E.g.   Ta/inpam/'pleasure'/miccarn/'remainder'/podi/'powder'
Te/inumu/'iron'/nippu/'fire'/sanci/'bag'
Ka/idu/'to put'/nillu/'to stand'/ili/'rat'
Ma/itu/'it'/vidu/'to leave'/vadi/'stick'

/e/ Mid, front, spread vowel

E.g.   Ta/enge/'where'/cedi/'plant'/angee/'there'

Te/ekkada/'where'/ceppu/'shoe'/katte/'wood'

Ka/e!e/'to move'/gellu/'to win'/ede/'chest'

Ma/edu/'to take'/vedi/'shot'/avide/'there'

/a/ Low, central, spread vowel

E.g.   Ta/ange/'there'/padam/'picture'/vara/'to come'

Te/akkada/'that side'

Ka/avanu/'he'/nanna/'mine'

Ma/adi/'blow'/vadam/'rope'/kada/'shop'

/o/ Mid, back, round vowel

E g.   Ta/orumay/'unity'/podi/'dust'/poo/'to go'

Te/okati/'one'/goppa/'big'

Ka/ondu/'one'/kodu/ 'to give'/eenoo/'what'

Ma/odi/'to break'/kodi/'flag'/poo/'to go'

/u/ High, back, round vowel

E.g.   Ta/ungal/'yours'/putu/'new'

Te/utt a/'empty'/puvvu/'flower'

Ka/uppu/'salt'/huuvu/'flower'

Ma/udu/'to wear'/pullu/'grass'

[In Ta and Ma /u/ has got an allophone (in) (High back spread vowel) which occurs in medial and final position in complimentary distribution or free variation with (u)]

2.3.2 *Consonants*

Stops /P b t d t t d c j k g/

All stops occur initially and medially in all languages except /t/ which occurs in Ma only in the medial position. (Voiceless stops in the intervocalic position are slightly voiced and fricativized in Ta; less tense and lenis in Ma.)

/p/ Bilabial voiceless stop

E.g.   Ta/pakal/'day time'/kapam/'phlegm'

Te/padi/'ten'/reepu/'tomorrow'

Ka/pance/'dhoti'/paapa/'poor'

Ma/petti/'box'/paapam/'sin'

/b/ Bilabial voiced stop

E.g.   Ta/bakti/'devotion'/ambu/'arrow'

Te/balam/'strength'/jeebu/'pocket'

Ka/bale/' net'/sabda/'sound'

Ma/beli/'sacrifice'/abatham/'wrong'

/t/ Dental voiceless stop

E.g.　Ta/tala/'head'/vaatam/'argument'
　　　Te/tala/'head' /Raata/' writing'
　　　Ka/tale/'head' /maatu/'news'
　　　Ma/teRiccu/'splashed'/pata/'froth'

/d/ Dental voiced stop

E.g.　Ta/daaram/'wife'/pandu/'ball'
　　　Te/dabbuna/'quickly'/peeda/'poor'
　　　Ka/dada/'shore'/adu/'that'
　　　Ma/daaham/'thirst'/vaadam/'argument'

/t/ Alveolar voiceless stop

E.g.　Ma/paatta/'cockroch'

/t/ Retroflex voiceless stop

E.g.　Ta/tin/'tin'/katan/'loan'
　　　Te/takkuna/'immediately'/aata/'play'
　　　Ka/tollu/'hollow'/'tuti/'lip'
　　　Ma/tseyam/'tuberculosis'/paatta/'tin can'

/d/ Retroflex voiced stop

E.g.　Ta/datoaaRam/'drum'/vandu/'beetle'
　　　Te/dabbu/'money'/aada/'female'
　　　Ka/dabbi/'tin can'/kaadu/'forest'
　　　Ma/deppi/'tin can'/vaada/'smell'

/c/ Palatal voiceless stop

E.g.　Ta/catni/'chatni'/miccam/'remaining'
　　　Te/cali/'cold'/vicaaRamu/'sorrow'
　　　Ka/cali/'cold'/haccu/'to stick'
　　　Ma/cakka/'jack fruit'/vaacakam/'sentence'

/j/ Palatal voiced stop

E.g.　Ta/jaati/'caste'/pujam/'shoulder'
　　　Te/jaali/'pity'/taajaa/'fresh'

　　　Ka/jaaRu/'to slip'/iiju/'to swim'
　　　Ma/jaalam/'trick'/raajaavu/'king'

/k/ Velar voiceless stop

E.g.　Ta/kaalu/'leg'/makan/'son'
　　　Te/kaalu/' leg'/kooka/'saree'
　　　Ka/kaalu/'leg'/caaku/'knife'
　　　Ma/kaalam/'time'/pakal/'day'

/g/ Velar voiced stop

E.g.   Ta/guru/'teacher'/tangai/'sister'

      Te/gaaji/'wind'/tega/'subject'

      Ka/gaaji/'wind'/tegeyu/'to take'

      Ma/gaanam/'song'/raagam/'tune'

Nasals /m n n ṇ ň ń/

/m/ Bilabial nasal

Occurs initially and medially in Te and Ka; initially medially and finally in Ta and Ma.

E.g.   Ta/makan/'son'/aamaam/'yes'

      Te/malli/'son'/tamaRu/'you'/koopam/'anger'

      Ka/mane/'house'/aame/'tortoise'

      Ma/mala/'hiU'/aama/'tortoise'/maram/'tree'

/n/ Dental nasal

Occurs initially and medially

E.g.   Ma/naalu/'four'/annatte/'of that day'

      (n is an allophone of /n/ in Ta, Te and Ka.)

/n/ Alveolar nasal

Occurs initially and medially in Te, and Ka; initially, medially and finally in Ta and Ma.

E.g.   Ta/naalu/'four'/panai/'palmyra'/makan/'son'

      Te/nalupu/' black'/pani/'work'

      Ka/naalu/'four'/naanu/T

      Ma/nyaayam/'justice'/annatte/'swan to'/avan/'he'

/n/ Retroflex nasal

Occurs medially in Ta, Te, Ka and Ma

E.g.   Ta/mani/'hour'

      Te/ganam/'group'

      Ka/jaana/'clever'

      Ma/kanam/'drop'

/n/ Palatal nasal

Occurs initially and medially in Ta and Ma (n is allophonic in Te and Ka.)

E.g.   Ta/naayaRu/'Sunday'/vinnaanam/'science'

      Ma/naan/T/manna/'yellow'

/n/ Velar nasal

Occurs medially in Ta, Ka and Ma

E.g.   Ta/maangaay/'mango'

      Ka/vaanmaya/'literature'

      Ma/maanna/'mango'

Fricatives /s s s h/

/s/ Alveolar voiceless fricative

Occurs initially and medially in Ta, Te, Ka and Ma.

. E.g.　Ta/sarasvati/'Goddess Saraswathi'/tasai/'flesh'
　　　　Te/sabha/'meeting'/kaasu/'sovereign'
　　　　Ka/saala/'loan'/hesaRu/'name'
　　　　Ma/saari/'saree'/asal/'genuine'

/s/ Retroflex voiceless fricative

Occurs medially in Ta, Te and Ma.　(/s/ is an allophone of /s/ in Kannada)

E.g.　Ta/visam/'poison'
　　　 Te/aasaadham/'a month'
　　　 Ma/kasaayam/'concoction'

/s/ Palatal voiceless fricative

Occurs initially and medially in Ta, Te, Ka and Ma.

E.g.　Ta/saandi/'peace'/isay/'music'

　　　 Te/sani/'a week'/aasa/'greedy'
　　　 Ka/satRu/'enemy'/naasa/'perish'

　　　 Ma/sasi/'moon'/pasa/'glue'

/h/ Velar voiceless fricative

Occurs initially and medially in Te, Ka and Ma.

E.g.　Te/hakku/'right'/daaham/'thirst'
　　　 Ka/hattu/'ten'/deeha/'body'

　　　 Ma/haranam/'division'/vaahanam/'vehicle'

/Laterals/111/

/1/ Alveolar voiced lateral continuant

Occurs initially and medially in Te and Ka; initially, medially and finally in Ta and Ma.

E.g.　Ta/laapam/'profit'/valay/'net'/pal/'tooth'
　　　 Te/lajja/'shyness'/maala/'garland'
　　　 Ka/laaya/'stable'/kale/'art'
　　　 Ma/laapam/'profit'/mala/'hill'/kadal/'sea'

/1/ Retroflex voiced lateral continuant

Occurs initially and medially in Ta, Te, Ka and Ma.

E.g.　Ta/valayal/'bangle'
　　　 Te/ka|a/'art'
　　　 Ka/male/'rain'
　　　 Ma/kala/'weed'

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/1/ Retroflex voiced medio-lateral continuant

Occurs medially in Ta and Ma.

E.g.   Ta/palam/'fruit'
       Ma/kala/'pole'

Flap and trill /r R/

/r/ Alveolar voiced flap continuant

Occurs initially and medially in Ta and Ma (/r/ is allophonic in Te and Ka).

E.g.   Ta/raajyam/'country'/maram/'tree'
       Ma/raagam/'tune'/vara/'line'

/R/ Alveolar voiced apical trill continuant

Occurs initially and medially in Te and Ka; initially, medially and finally in Ta and Ma.

E.g.   Ta/Raani/'queen'/aRivu/'knowledge'/avaR/'they'
       Te/Raani/'queen'/aRa/'half'
       Ka/Ratte/'shoulder'/kaRu/'calf'
       Ma/Raani/'queen'/paRa/'a measure'/avaR/'they'

Frictionless continuants /v y/

/v/ Labial voiced frictionless continuants

Occurs initially and medially in Ta, Ka and Ma; initially in Te.

E.g.   Ta/vaanam/'sky'/utavi/'help'
       Te/veyyi/'thousand'
       Ka/vaanti/'vomiting'/avanu/'he'
       Ma/vaRsam/'year'/avaR/'they'

/y/ Palatal voiced frictionless continuant'

Occurs initially and medially in Ta, Te, Ka and Ma.

E.g.   Ta/yaanay/'elephant'/aayiram/'thousand'
       Te/yugam/'decade'/kooya/'hunter'
       Ka/yaava/'which'/saayu/'to die'
       Ma/yaatRa/'travel'/ayal/'neighbourhood'

3.0   *Discussion*

Based on the analysis it is found that Malayalam has the maximum number of feature distinctions and maximum number of phonemes among the four languages. When feature distinctions I to VIII and IX are phonemic commonly in all languages feature XI is phonemic only in Ta and Ma and feature IX is phonemic in Ma only. Feature IX separates the alveolar sounds from the dental sounds.   But this feature is though not phonemic in Te and Ka are available in the phonetic level in these languages. Feature XI separates the medio-lateral retroflex continuant from the lateral retroflex continuant. Availability of this feature can separate Ta and Ma

from Te and Ka. Ta and Ma are more related in phonological structure than Ta and Te or Ta **and** Ka. So also Te and Ka show more relatedness in phonological structure.

Since Ma possesses alt the feature distinctions that are commonly available to all the languages a native speaker of Ma will not find difficulty in identifying all the phonemes of the other three languages. But a native speaker of Ta or Ka may fail to distinguish the dental and alveolar stops and nasals of Malayalam, because sharp feature is only allophonic in these languages. Also native speakers of Te and Ka will have difficulty in the identification and production of the mediolateral retroflex continuant, since the feature strident is not available in Te and Ka.

A speech clinician whose native language is Ma may tend to over differentiate the sounds when he is to work with the other three languages and underdifferentiation may be the case when a native speaker of Ta, Te or Ka tries to teach Ma.

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