

Tolkappiyar and the Science of Phonemics

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DEDICATED TO THE LATE PROFESSOR W. MEYER-EPPLER *

ABSTRACT

The importance of a detailed study of Tolkappiyam was stressed in my monograph. A detailed study of some of the Sūtras is undertaken now.

Interpolations are found in ancient classics—lines 2, 3, and 4, of the first Sūtra of Pirappiyal are proved to be interpolations.

'Unti' is defined as the diaphragm and the first Sūtra is critically examined. The substance of this Sūtra is briefly this: This upward breath pushed out by the diaphragmatic action enters the vocal organs, attains formation and then falls into a regularity. The Sūtra further says that when the speech sequence is analysed into phonemes of which it is composed and the component elements of the phonemes are examined, the formative compositions which bring these phonemes into existence are varied and different in their characteristics.

INTRODUCTION

In my monograph, 'Phonemics of Old Tamil'¹ I stressed the importance of a critical study of *Tolkappiyam*. It is necessary to recall those very words I used then. I

* Professor W. Meyer-Eppler was a great scientist friend of the author of this paper. He took great interest in the Aytam phenomenon of Tolkappiyar and the alpha-phonoid theory of the author. He, it was who moved the German academy for research and the Bonn University to invite the author of this paper as a visiting professor at Bonn in 1960. The author C. R. Sankaran cannot adequately express in words how much he owes to the late Professor W. Meyer-Eppler for the many generous encouragements he had received from him in the scientific work. He was greatly interested in placing the study of phonemics on a mathematical basis and did much to popularise this in Germany. He died at the age of 47 on Friday the 8th of July 1960 when the author was at Bonn.

¹ *Phonemics of Old Tamil*, Deccan College Monograph Series 7, Poona, 1951.

wrote, "We are lost in wonder that in this old Tamil grammar, we re-discover, as it were, many of our own modern ideas. The conviction is gained more and more that it is worth the while to subject *Tolkappiyam* to a detailed scrutiny exploiting this beautiful work from the rigorous viewpoint of modern Phonemics."² It will be obvious from these words that my monograph was not prepared after a critical or detailed study of this great work — which may well nigh take the life-time of a competent scholar — but only after a surface-study, as it were, by rough and ready method. I have sufficiently indicated in my monograph that I followed mostly the English translations of Dr. P. S. S. Sastri only on the bare surface. Divergencies from his translations for obvious scientific reasons were also indicated by me suitably.³

I was so overwhelmed with the rich harvest which even this rough and ready method yielded, and the phonemic truths found even on the surface of this exquisite work were so astounding, I thought it my duty to proclaim them to the modern world without waiting for critical or detailed study. After the publication of my monograph, I rather concentrated myself in investigating, developing and explaining my alpha-phonoid theory based on the Aytam-phenomenon which I picked up from *Tolkappiyam*, straying of course, now and then, into allied fields for a while.

It was a lucky accident that I read one of the valuable articles of Rao Sahib K. K. Pillai in the TAMIL CULTURE, as my attention to it was drawn by one of my friends. Subsequently I got into correspondence with him which dragged me again to the study of *Tolkappiyam*. His correspondence was so thought-provoking and illuminating that it goaded me to dive deep into at least some of the basic sūtras relating to phonemic structure found in

² Page 58 of Ref. No. 1.

³ cf. Foot note 21 on page 13 of Ref. No. 1.

‘Pirappiyal’, the chapter on the birth of the phonemes, as it is usually translated and some of the results of this study are set forth in the present paper.

INTERPOLATIONS

To rejoice in the glory of the past has always been a human trait all through the ages. Exploiting this universal interest in the past glory, the malignant busybody has been at work all over the world to create glory where it did not exist and to white-wash the black spots wherever they existed, resorting to interpolations, forgeries and other questionable methods. It is the considered opinion of the research scholars that no ancient classic is free from this evil. It is therefore necessary for anyone who takes up a critical study of any ancient work to spot out first the interpolations, if any, and to eschew them. Interpolations often introduce new thoughts which do not generally fit into the particular pattern of the thought of the author and the consequent lapses, therefore, of the interpolator cannot withstand the scrutiny of a critical investigator. It may be taken as a general principle, that whatever is repugnant or contrary to the main text of any ancient work should decidedly be an interpolation. With these broad principles in view, the chapter on the birth of phonemes (chapter III) will be examined.

The chapter opens with the following sūtra :—

Unti mutalā muntuvali tōnrit
 Talaiyiṇu mitatrṇu nenciṇu nilaiip
 Pallu mitalu nāvu mūku
 Maṇṇamu mulappaṭa veṇmurai nilaiyā
 Nuruppu ramaiya nerippaṭa nāṭi
 Yellā veḷuttun collun kālaiṭ
 Pirappi nākkam vēruvē riyaḷa
 Tirappaṭat teriyuṇ kāṭchi yāna.

உந்தி முதலா முந்துவளி தோன்றித்
 தலையினு மிடற்றினு நெஞ்சினு நிலைஇப்
 பல்லு மிதமு நாவு முக்கும்
 அண்ணமு முளப்பட வெண்முறை நிலையான்
 உறுப்புற் றமைய நெறிப்பட நாடி
 எல்லா வெழுத்துஞ் சொல்லங் காலைப்
 பிறப்பி னுக்கம் வேறுவே நியல
 திறப்படத் தெரியுங் காட்சி யான்.

This forms the introduction to the subject of phonemic structure dealt with in this chapter and facilitates the correct understanding of its scientific basis. Though laconic in style, the brief and pithy words reveal the analytic study which the author made of the speech sequence to arrive at the phonemic units and the principles of phonemic structure.

LINE 2 TO 4 ARE INTERPOLATIONS

A critical study of this sūtra reveals that its lines 2, 3 and 4 are interpolations. They mar the general trend of the sūtra and its aphoristic nature. They do not fit into the pattern of thought embodied in the rest of the lines. The thought embodied in line 1, runs without hindrance into line 5, in orderly sequence as தோன்றி, உற்று, அமைய, நெறிப்பட, etc. and does not need the intervening lines for its continuity. The insertion of the lines 2 to 4 in between them disrupts the thought structure, inverts the sequence of the thought as well as the grammatical construction.

The second line asserts that the breath stays or halts (நிலைஇ) in the head etc. and the fourth line continues this ill-conceived idea and includes head as one of the positions which produce phonemes! Tolkappiyar nowhere mentions, either in this chapter or elsewhere, head, as one of the vocal organs, which gives rise to phonemes. In the stream of speech there is no room for the breath to enter the head or sojourn there. It is not only erroneous but

even ridiculously preposterous to state that the breath halts in the head to produce a phoneme at all !

The lines 2, 3 and 4 thus offend the physiological truth obviously being contrary to it and are therefore manifestly repugnant to the rest of the chapter and to *Tolkappiyam* as a whole. They have therefore to be expelled as flagrant interpolations, which clearly they are without doubt ! Evidently some misguided enthusiast introduced these lines to rectify a supposed defect in order to place the phonemes of *Tolkappiyam* on a par with Sanskrit phonemes of so called *murdhanya* variety.

DERIVATION AND DEFINITION OF UNTI

This sūtra offers yet another impediment to the correct understanding of its meaning. The very first word in the first line Unti உந்தி has to be critically examined for its correct meaning.

This unti has been interpreted by all the commentators to mean the *nābhi* of the Sanskrit, i.e. the navel. No doubt a few Sangam poets and later writers have also used this word in this sense but the word carries in itself its own meaning which is far different from what it has been taken to mean all along quite apparently. உந்தி is derived from the word உந்து which means to push out or thrust away. உந்தி therefore means that which pushes or thrusts away (உந்துவது உந்தி). The difficulty encountered by the commentators who came more than a thousand years after the author had not been so much in finding the meaning of the word as it was obviously in identifying the human organ which performs the biological function denoted by the word, putting themselves on a false search, as it were !

The navel or the umbilical chord, which this word has been taken to mean wrongly, is really called கொப்பூழ்

Koppūl in Tamil which is the shortened form of கோப்பூழ் (கோப்பு+ஊழ்=கோப்பூழ்). கோப்பு means that which connects and ஊழ் means that which comes off in natural course. The meaning of கோப்பு is obvious and that of ஊழ் requires elucidation. ஊழ்த்த or ஊழ்ப்ப in the sense of coming off or falling away is often used in Sangam literature. பழம் ஊழ்த்து (புறம். 381), மென்கொம் பூழ்த்த மணிமருள் பூவின் பாடு (குறுந்தொகை, 138), and கொங்கம் பொன்னென தாதுழ்ப்ப (கலி. 33) are some of the instances of such an usage. ஊழ் Ūl denotes fate as that which comes off in natural order as a sequence of one's own past actions. கோப்பூழ் thus denotes that which connects with the mother's womb or the placenta therein and comes off in natural course at the time of parturition. No better physiological term than this can be thought of to express the navel. The words umbilical chord or navel and even nābhi meet it half way only as they superficially refer to the central position in the body. No other word to supplant this tell-tale scientific term in Tamil seems to be found. The function of this கோப்பூழ் is to draw and absorb nutrition from the mother and its function is obviously not to push out or thrust away anything! Is the genius of Tamil language reflected here which brings into awareness what otherwise would have remained as an unconscious "yearning to be re-united with childhood with the shelter and protection of motherly aid" carried to the womb itself in the pre-natal period? (cf. Joist A. M. Merrloo—*The Two faces of Man—Two studies on the sense of time and of ambivalence*, International Universities Press, Inc., New York, 1954, p. 68.)

The human organ which in reality has the function of pushing out or thrusting away (உந்துதல்) is the diaphragm. It thrusts away the lung which sits on it and thus causes the breath to get out and causes the phenomenon or speech. If we are to be guided by the scientific content of the word உந்தி, the organ denoted by it is unmistakably the diaphragm and nothing but the diaphragm.

I am fortified in this derivation and identification by the definition given by Swami Vipulananda (late professor and head of the department of Tamil, Ceylon University, Colombo) for one of the parts of the ancient Tamil harp, *Yāl*. (யாழ்), which was also called *Unti* whose function, according to him, was to push away the sound which reached it and thus cause reverberation. I give below his very words :

“உந்தி என்னும் சொல் உந்து என்னும் வினையடியாகப் பிறந்ததென்பது ‘சென்று வாங்கு உந்தி’ என்பதனால் தெளிவாகின்றது. உந்தி என்னும் பெயர் கொப்பூழுக்கு உளதாதல் பற்றிக் கொப்பூழ் போன்ற வட்டவடிவமாகிய யாழ் பத்தற்றுளையினை உணர்த்திற்று எனக்கொண்ட மயிலை நாதருரை பொருந்தா உரையாதல் காண்கின்றோம்.”

(p. 45. *Yāl Nūl* (Tamil) published by Karanthai Tamil Sangam.) May we not pause a while here, in asking ourselves incidentally as it were, whether it is merely a strange coincidence that a musical term extends its helping hand to rescue from oblivion what in reality is obviously a precious term in phonemic science? (I am indebted to Rao Sahib Pillai for drawing my attention to this reference and furnishing the extract.)

Tolkappiyar thus undoubtedly leads the way to modern biolinguistics and biophysical studies of human speech.

“The primary physical impulse comes from the diaphragm or midriff, that dome shaped sheet of fibrous tissue which is the muscle of respiration. This tendinous partition separating thorax from abdomen turns its concave side downwards and it is fastened to the sternum or breast bone in front, to the lumbar vertebrae behind and to the cartilages of the lower six ribs on either side . . . As the outgoing breath stream is forced by diaphragmatic pressure upwards (உந்தி முதலா முந்துவளி தோன்றி as *Tolkappiyam* puts it) from the lungs through the bronchial

tubes and the trachea or wind pipe into the mouth it may be checked or impeded in various ways,"⁴

so as to give us the speech sounds. This formed the subject of one of my Bonn University lectures concerned with process of speech. It is the exploitation of this breath movement by human ingenuity which has given us the spoken language and which has revolutionised the human kingdom and made it what it is today !

THE SPEECH STRUCTURE

The upward breath (முந்துவளி) makes its appearance (தோன்றி) in the sphere of speech sequence, reaches the vocal organs (உறுப்புற்று) and attains formation (அமைய). The word அமைய is from the root அமை which means to form or make. All the other meanings assigned to this word are only its derivative meanings.

The organs reached are not mentioned here nor are the formations attained given. The interpolated lines describe these organs in detail, though wrongly, but leave off the formations. If the author mentioned the details of these organs he would have doubtless described the details of the formations too ! This is not the place to furnish the details of any of them. This is only an introductory sūtra where these will be redundant and out of place. Tolkappiyar had recognised this. It is for the sūtras which follow — the text proper — to take up the thread and give the necessary details. This is how the interpolated lines do not fit into the pattern of the thought and plan of the author and betray their intrusion.

The structural formations observed are not haphazard events appearing in any manner but follow an orderly sequence. They fall into a regularity (நெறிப்பட) as stated by the author. What a deep insight Tolkappiyar has dis-

⁴ Simeon Potter's *Modern Linguistics*, Andre Deutsch, 1957, pp. 14-15,

played ! and how scientific have been his observations !! It is this fundamental law of regularity into which these formations fall which has made them amenable to scientific or mathematical treatment. It has been my life's ambition to take up these at the stage where Tolkappiyar left them and reduce them to mathematical formulae for the modern world. I have been attempting, in my humble way, to do this in all my work, including my lectures now at Bonn.

The knitting together of these short, telling words, தோன்றி, உற்று, அமைய, நெறிப்பட, in rapid succession, raises itself a mental picture of the rapid stream of speech-sequence ! One who follows the author closely cannot but feel the effect of the artistic rapidity and the logical sequence !

The author studies this speech structure. He studies its processes நாடி with an ardour and earnestness. The word நாடி means விரும்பி ஆராய்ந்து and denotes a research with ardour and earnestness which are the prime requisites for any scientific investigation (நாடிய பொருள் கை கூடும்-கம்பன்; எழுத்தும் சொல்லும் பொருளும் நாடி, பனம்பார னூர்-தொல். பாயிரம்). These basic factors of research, ardour and earnestness have taken the author to the depths of the intricate processes, and made his findings amazingly modern.

ANALYSIS OF THE SPEECH SEQUENCE

Now follows the next stage, எல்லா எழுத்தும் சொல்லும் காலை. All the phonemes are to be found, enumerated and described. The speech sequence has to be broken into the various sound-units of which it is composed and forms a synthetic structure. The primary speech-units which are obtained on analysing the speech-sequence are called phonemes in modern language. Phoneme is called எழுத்து Eluttu, in Tamil (from the root எழு to rise) which means that which arises or forms from the breath.

This analysis is by no means easy. Only those who have been actually at it can realise the difficulties involved. In the speech-stream some of the speech-units may get drowned, some may become merged with one another, some may get dissolved, lose their identity and appear durationless. The functional activities of the vocal organs may overlap. All these have to be observed minutely and then only all the phonemes which go to make up the speech-structure have to be fixed with precision, their number enumerated and arrived at correctly. The term சொல்லுங் காலை means and includes not only the number of these phonemes to be told off, எல்லா எழுத்தும், but their descriptions as well. Only the study of the compositions which go to make up each of the phonemes can help to identify, each from the other, as separate units and to count them out as all the phonemes, எல்லா எழுத்தும், that constitute the speech-structure.

A clear and unerring perception of all these is therefore necessary. This perception has therefore to be திறப்படத் தெரியும் காட்சி - காட்சி means perception. திறப்படத் தெரியும் காட்சி therefore means a perception in which all the minute parts of the intricate structure will get analysed (திறப்பட) and will be seen clearly (தெரியும்). Nothing but a sure perception as this, will yield observational knowledge to form the basis of any science. Such a perception as this is vital especially when the subject dealt with is 'Sound' which is not easily amenable to analysis as other material objects are! Tolkappiyar obtained this rare and vital perception which is the *sine qua non* of phonemic science and by that perception, திறப்படத் தெரியும் காட்சியான், he proceed⁸ to describe the phonemes.

It is to emphasise the importance of this perception the clause which deals with it — திறப்படத் தெரியும் காட்சியான் — has been so purposefully fixed at the end of the sūtra to leave a lasting impression upon the mind of the reader while studying the sūtra, untrammelled by the

other thoughts which precede. Taking the important thought in a stanza to the end has been the *modus operandi* in ancient classics and has been the practice of the great poets of the Sangam age. It may also be noted that by the position which this clause occupies, it governs grammatically both the analysis of speech-structure எல்லா எழுத்தும் சொல்லுங் காலை and பிறப்பின் ஆக்கம் the composition of speech-unit which follows it.

PHONEMIC STRUCTURE

The word திறம் means here கூறுபாடு i.e., the component elements or the constituent parts. (நிற்றிறம் சிறக்க. புறம். 6). Each of the phonemes has its own component parts and these component elements may broadly be divided as acoustic and articulatory. The famous French scientist De Saussure aptly describes this :

“The delimitation of the sounds of a speech sequence can be based only on the acoustical impression ; but, as far as the description of sounds is concerned, it is different. It is recognised to be built only on the basis of the articulatory act ; because the acoustic units taken in their proper succession are unanalysable. One must take recourse to the succession of the movements of phonation ; it is then observed that to the same sound corresponds the same act : b (acoustic time) = b' (articulatory time).

“The primary units which are obtained on dividing the speech sequence will be composed of b and b' ; they are called *Phonemes* ; the phoneme is the sum of the acoustic impressions and the articulatory movements, the heard unit and the spoken unit, the one conditioning the other : thus it is already a complex unit, having a hold in each speech sequence.”⁵

⁵ Rulon S. Wells, *De Saussure's System of Linguistics*, Word, Vol. 3, 1947, p. 2. Translation of the portion quoted was made by Dr. P. C. Ganesh Sundaram, Reader in Experimental Phonetics, Annamalai University (Cf. *Phonemics of Old Tamil*, p. 37 foot note 100).

The acoustical impression is that by which we judge the form of the sound-units, their individual existence each separate from the other, in time and space and the articulatory movement includes the movement of the breath, the physical impulse, the muscular actions of the breath-group and the functional status of the vocal organs to bring the sound-units into existence. Each phoneme is thus composed of articulatory element and acoustic element, one conditioning the other as De Saussure puts it. It will be seen from the text which follows that Tolkappiyar classifies the acoustic forms of the sound as well as the corresponding articulatory movements of the vocal organs, combining into various groups into which they naturally fall. Tolkappiyar by an analytical perception திறப்படத் தெரியும் காட்சியான் not only fixes the number of phonemes which are found in the speech-structure correctly but also finds that their பிறப்பின் ஆக்கம், their formative compositions — acoustic and articulatory — are of varied and different characteristics, வேறு வேறு இயல. The sūtras which follow illustrate and demonstrate them.

In its pristine simplicity, the sūtra flows, தோன்றி, உற்று, அமைய, நெறிப்பட (இவற்றை) நாடி, திறப்படத் தெரியும் காட்சியான், எல்லா எழுத்தும் சொல்லும் காலை (அவைதம்) பிறப்பின் ஆக்கம் வேறு வேறு இயல and carries with it its own grandeur. The apparent transparency deludes the eye, conceals the depth and often frustrates the search! A more appropriate introduction embracing all the aspects of the subject dealt with in the chapter cannot be thought of, it is obvious.

It is here worth while to take note of the luminous phrase which Tolkappiyar has coined as பிறப்பின் ஆக்கம். The word பிறப்பு means coming into existence and ஆக்கம் means growth, composition or development. (cf. கிளவியாக்கம், பொருளாக்கம்). There are thus two elements in this term, ஆக்கம் and பிறப்பு. The composition of articulatory-unit and acoustic-unit into one is ஆக்கம் and

this composition bringing into existence a new entity, the phoneme, is பிறப்பு.

That Tolkappiyar used பிறப்பின் ஆக்கம் exactly to mean these will be proved by the fact that he calls the formation or composition of words, their growth and multiplication as கிளவியாக்கம் (It should be noted that no பிறப்பு is added in that context.) The various factors which go to make up the word-formations, their growth and multiplication are merely strung together to a stem as in a bead, as it were, where each is piled quite close to the other to form a developed structure. No new entity is born here. This formative process is far different in the case of a phoneme. Two different units, the acoustic unit and the articulatory unit, combine into one to give birth to a new entity the phoneme or எழுத்து. This is therefore described as பிறப்பின் ஆக்கம் and not as எழுத்தின் ஆக்கம் — as in the case of கிளவியாக்கம் — not even as எழுத்தின் பிறப்பு but distinctly as பிறப்பின் ஆக்கம் i.e., பிறப்பு and ஆக்கம் combined.

The grammarians and commentators who succeeded Tolkappiyar converted this highly scientific term பிறப்பின் ஆக்கம் into பிறப்பிடம் the place of birth ! I have shown in my monograph how places of birth and even places of articulation are scientifically inaccurate and Tolkappiyar nowhere uses such an inaccurate term.⁶

G. Oscar Russel, the great pioneer, by bringing X-Ray to the service of phonetic science, fixed with accuracy and demonstrated the forms and sizes of human speech cavities as also the position and relative relationship of the various physiological organs which actually appear when producing certain speaking resultants; the connected movements of muscles regulating the vocal cavity are not and never can be still for an instant.⁷

⁶ Page 13 of Ref. No. 1.

⁷ *Speech and Voice* by G. OSCAR RUSSEL, New York, Macmillan & Co., 1931 p. 4.
cf., also *Phonemics of Old Tamil*, page 13, foot notes 23 and 24.

The demonstration of the fallacy of the “places of articulation” relied upon by the earlier phoneticians now confirms the valid usage of the ‘analytic-synthetic’ term of Tolkappiyar பிறப்பின் ஆக்கம் being scientifically precise.

It is marvellous that this ancient tiny phrase, பிறப்பின் ஆக்கம் is thus replete with the results of modern scientific investigations. It thrills one to think of the wealth of analytic perception, the depth of scientific knowledge and the ‘logical positivism’ which have gone into the core of this puny phrase, as it were. How this author, in those ancient times, without resorting to modern precision apparatus and rigorous mathematics, was still able to perceive the vital truths of an abstruse and intricate science, it staggers the human brain to conceive of. •